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ABSTRACT

One of the largest investigations of elementary education ever undertaken, the Sustaining Effects Study sought answers to a series of policy questions. The two major issues addressed by the study were (1) Who receives compensatory education (CE)? and (2) How effective is CE? Related to these primary issues were a number of secondary questions: (3) What is CE? (4) What is the nature of the process of classroom instruction in elementary education? (5) What happens to the achievement of students when their CE services are discontinued? (6) Is there an optimal duration and period for receipt of CE services? (7) What happens to student achievement over the summer, and is summer school effective? (8) What is the nature of the home environment of elementary school students? and (9) What are the relative contributions of socioeconomic background and schooling toward school achievement? To obtain answers to these questions, a large amount of data was gathered through a complex design. Five substudies were initially planned: a longitudinal study assessing educational achievement for 3 consecutive years; a study of successful instructional practices in high-poverty schools; a study of participant characteristics and relationships among economic status, educational need, and instructional services received; a cost-effectiveness study focusing on resources and services to which students were exposed during reading and math instruction; and a study of the effectiveness of summer school programs. A sixth substudy was added later and involved following a limited sample of students into their high school years. Numerous instruments were used to gather data from students and teachers. (Specific study designs, variables investigated, and results obtained are discussed.) (RH)

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A STUDY OF
COMPENSATORY AND ELEMENTARY EDUCATION:
THE SUSTAINING EFFECTS STUDY

FINAL REPORT

Launor F. Carter

January 1983

Prepared by the System Development Corporation
for the

OFFICE OF PROGRAM EVALUATION

DEPARTMENT OF EDUCATION

PS 014350

PREFACE

The Sustaining Effects Study is one of the largest studies of elementary education ever undertaken. The general design of the study was detailed in the Request for Proposal issued by the U.S. Office of Education in the spring of 1975. Dr. George Mayeske was the author of that document and was the originator of the ideas expressed in it. After the study was started, Dr. Mayeske was intimately involved in the implementation of the overall design. Much of the credit for whatever success this study has is due to his basic ideas. In addition, Dr. Mayeske devoted himself to giving the study superb administrative support. Within the Office, and later the Department of Education, he secured financial support, expedited forms clearance, arranged meetings with Title I staff members, and contacted chief state school officers to arrange for their cooperation in securing the consent of local schools to participate in the study. In short, he was everything one could want in a Project Officer. From the beginning, Dr. Janice Anderson was associated with the study as Associate Project Officer. When Dr. Mayeske transferred out of the Department of Education, she became the Project Officer and carried on in the same fine manner as Dr. Mayeske had during the first five years of the study. She continued to support the project in an exemplary fashion with good budget support and excellent critical reviews of the first drafts of all the technical reports. These two dedicated government project officers deserve the sincere thanks of both the educational research community and our project staff for their dedication to this project and educational research in general.

We were most pleased with the willingness of so many schools to work with us for three full years. When initially approached about participating, a surprisingly large number of schools agreed to be part of the study. They committed themselves to having a fall and a spring test administration, to supplying us with data on the instruction received by each individual student in the school, and to supplying information on the staff. With very few exceptions, the schools remained with the study for as long as they were needed and cooperated willingly in a demanding research schedule. We express our great appreciation to them for their participation.

Finally, I would like to thank the staff and the advisory committees that were so essential to completing the work. They are listed on pages xvii and xix All of our advisors were very helpful and made material contributions to the improvement of the design and conduct of the study. Some of them stayed with the study for eight years! They deserve our real thanks. The senior staff also stayed with the project as long as they were needed. As the Project Director from 1975 to 1981, I can attest to their devotion and hard work in making the study a success. I hope that when all the technical reports are examined and this final report is studied and evaluated, there will be some consensus that this cooperation and effort have made a lasting contribution to our understanding of elementary education.

Launor F. Carter
January 1983

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CHAPTER I. AN INTERPRETIVE SUMMARY OF THE RESULTS OF THE SUSTAINING EFFECTS STUDY

AN OVERVIEW OF THE REPORT

The purpose of this report is to present an integrative summary of the results of the Sustaining Effects Study (SES). A short summary of the questions asked and the findings follows:

1. What Is Compensatory Education?

   This question cannot be answered simply. Compensatory Education (CE) is an amalgam of many different services delivered in different ways. However, it is clear that CE students receive services that are to some extent different from those they would have received had they not been selected for CE services. CE students, relative to regular students, receive more hours of instruction in reading and math. The instruction is in smaller classes; more of it is in small group settings, and more of it is given by special teachers and aides. The instruction is more varied, involves different content and methods of instruction, and more materials and equipment are used. The typical mode of CE instruction is in a pull-out setting. The pull-out setting seems to offer a positive learning environment and rates very favorably when compared to other instructional settings. Although CE students receive significantly more expensive instruction, and although they receive much more basic reading and math services, while they receive their compensatory instruction, they lose out on some of the instruction that regular students receive.

2. Who Receives Compensatory Education?

   It is clear, in terms of percentages, that poor children and educationally needy children are the principal recipients of Title I and other CE services. However, there are more non-poor than poor children, and more children achieving above an educational cut-off point (such as performing one year below grade level) than there are children below such a level. The absolute number of children receiving CE who are non-poor and achieving higher than one year below grade level is greater than the number of children receiving CE services who fall below these cutoffs. Thus, while the trends are in the intended direction, it appears that there could be a better operation of the selection process to assure that more poor children, and more educationally needy children receive CE services. Possible improvements partially depend on a clarification of the intent of Congress regarding who should be served.

3. How Effective Is Compensatory Education?

Based on the results of data from the first year of data collection and from analyzing three-year longitudinal data, it appears that CE, and particularly Title I, is effective in improving the reading achievement of students in the first, second, and third grades. It is effective in improving the math performance of students in all elementary grades. The amount of improvement relative to similar students who have not had CE services is not large, but it is statistically significant. The results of the three-year longitudinal study confirm the results for the first year. A number of different analyses show that many of the less disadvantaged Title I students benefited from a year of Title I services and who 'promoted out'. However, the most severely disadvantaged students usually received Title I services during all three years of the study and did not show gains relative to similar students who did not have Title I.

4. What Happens to the Achievement of Students When Their CE Services Are Discontinued?

There is considerable turnover among students receiving CE. About 40 percent of the students receiving Title I services in a given school year will not be receiving them the ensuing year. The figure is even higher for other forms of CE. The data show that students who have had their CE services discontinued do, in fact, receive services similar to regular students. Discontinuation of CE services does not seem to have a deleterious effect. Students who lose their CE services because they achieved at a level that 'promoted them out' of CE continue to perform at their relatively higher level.

5. What Happens to Student Achievement Over the Summer, and Is Summer School Effective?

Generally all groups of students continue educational growth over the summer. This growth is greater in reading than in math. There appears to be a slightly greater summer growth for regular students than for CE students in reading but not in math. This difference is judged to be practically insignificant. In comparing students who attended summer school with students who did not attend summer school, no increased achievement was evident. It is emphasized that the amount of instruction in reading and math in the typical summer school is quite small and it is probably unrealistic to expect much academic growth.

6. What Classroom Practices Influence Learning?

The many factors influencing classroom instruction were examined. A model of the elementary education process was developed. The model included the interrelationships between school achievement gain and student's economic background, opportunity to learn, instructional practices, resources available, staff characteristics, coordination of instruction, and principal's instructional leadership. The model was fitted to the data obtained from interviewing principals and teachers, and from observations in the classroom. The best fitting model showed the process of elementary education to be surprisingly complex and not dependent on any simple or straight-forward relationships.

7. What is the Nature of the Home Environment of Elementary School Children?

The usual home of an elementary school child is a two-adult family home, with parents about 35 years old; they are white, living in a single-family dwelling and have graduated from high-school. However, there are from 20 to 35 percent who come from homes with different characteristics. The usual child spends about two hours during the day playing, about one hour doing chores, about two hours watching TV, an hour reading for pleasure, and an hour doing homework. Almost all parents expect their children to graduate from high-school, and about 25 percent expect them to graduate from college. Over 75 percent of the parents rate the quality of their children's schools as excellent or good. When the home environment of Title I students is compared to that of regular students, the two home environments are quite similar, although there is a slight tendency for Title I children to come from less advantaged homes.

8. What is the Relative Contribution of Background and Schooling to the Students' Academic Achievement?

Based on data collected from home interviews, from the schools, and from the students, it was possible to form indexes for student background, school characteristics, and school learning experiences. In analyzing these relationships, it was found that while background characteristics were important determinants of achievement, the school learning experiences were also important, particularly in the early grades.

These are the major results of the study. In the sections that follow these results are given in more detail and their implications are discussed. The detailed results of the study have been reported in the series of technical reports listed at the end of Chapter II. Generally, the technical reports do not contain extensive interpretive or policy-oriented discussions. It is the intention of this report to summarize the important highlights of the reports, to integrate them, and to draw policy implications. The drawing of policy implications is necessarily a somewhat speculative activity because, when done by a technical contractor, it reflects a limited perspective and one largely based on research data. Questions of congruence with other program objectives, and political considerations are frequently not adequately reflected in a researcher's thinking. While the interpretations offered here need to be viewed as reflecting a limited perspective, they do have the distinct advantage of being based on the analysis of factual data.

In this chapter a statement of the problem as studied in each of the subsequent chapters will be given; there will be a summary of the data available, and then a discussion of the possible implications of that data. Each of the subsequent chapters contains a more detailed presentation, so written as to be of interest to policy makers, educators, and citizens seriously concerned about elementary education. Each of the chapters in this report is based on the relevant technical reports.

HIGHLIGHTS OF CHAPTER II - INTRODUCTION

This chapter begins with a short history of the Sustaining Effects Study (SES), pointing out that it started in July 1975 and, after a year of planning and preparation, data collection was begun at 329 public elementary schools in the fall of 1976. Data were collected for three successive school years. Each fall and spring all of the students in each school took achievement and attitude tests; their teachers indicated the amounts and kinds of instruction each child received in reading and math during the school year, and the teachers and principals reported on their own training, characteristics, and methods of instruction.

The data collected were designed to help obtain answers to a series of policy questions. The two major issues were:

1) Who receives compensatory education?

2) How effective is compensatory education?

Related to these primary issues were a number of secondary questions:

3) What is compensatory education?

4) What is the nature of the process of classroom instruction in elementary education?

5) What happens to the achievement of students when their CE services are discontinued?

6) Is there an optimum duration and period for receipt of CE services?

7) What happens to student achievement over the summer and is summer school effective?

8) What is the nature of the home environment of elementary school students?

9) What are the relative contributions of socio-economic background and schooling to school achievement?

The remainder of Chapter II discusses the design of the Sustaining Effects Study, the various samples used in the study, the test and survey instruments used to collect data, relations with the schools and how the data were collected, the 'in-depth' study of high-poverty schools, and the series of technical reports. It is believed that data of high quality were collected on a very large number of regular and CE students. The resulting data base constitutes the largest and most thoroughly integrated body of information about elementary education that has ever been collected.

HIGHLIGHTS OF CHAPTER III - WHAT IS COMPENSATORY EDUCATION?

CE cannot be defined or described simply. It is an amalgam of many different programs, practices, and services. Chapter III contains several descriptions of CE programs. These qualitative descriptions support quantified material gathered from the schools by the use of survey questions completed by school superintendents, principals, and teachers. From data collected in 1976-1977, we determined that for the SES schools the average amount spent on the education of regular elementary students was $1,189. For students receiving Title I services this basic amount was supplemented by about $436. The exact additional amount is hard to determine because of the difficulty in determining precisely the number of students receiving Title I services, but the general magnitude of these figures is illustrative of the cost of the additional services Title I students receive. This additional money buys a considerable mix of different services. The largest amount of Title I funds pays for additional regular teachers, special teachers, aides, and other instructional personnel. Smaller, but significant, amounts go for administrative services, training, planning, and evaluation. Also, Title I funds are used for instructional materials and audiovisual equipment, as well as for building alterations. Students receive guidance, counseling, health, and nutritional services from Title I funds. In Chapter III the relative costs of these services are given.

Knowing where the money goes is interesting, but one wonders what actual impact it has on instruction. In terms of the number of hours of reading and math instruction, Title I students receive more hours of instruction than regular students in the same schools. In reading, in the first two grades, there are only small differences, but as grade increases there are large differences. For example, by the sixth grade Title I students receive 6.6 hours of reading instruction per week, while regular students receive 5.0, a supplement of 32 percent. In math there are significant differences in all grades, with Title I students receiving about 5.7 hours of instruction per week, while regular students receive about 4.9 hours, a supplement of 29 percent. These figures are reassuring insofar as they show that Title I students actually receive more instruction in basic subjects, but there is another side to the picture. The length of the school day is usually the same for all students and while the Title I students are receiving additional reading and math instruction, the regular students are receiving other instruction. For example, teachers report that while Title I students are receiving additional reading instruction, the regular students are receiving instruction in reading, math or other subjects; are engaged in individual instruction; or are engaged in student-selected activities. Thus, while Title I students are getting more basic instruction, they are losing out on other instruction. Unless the number of school days is increased or the school day is extended for Title I students, this result is inevitable, and one can question if Title I students are receiving a net benefit.

Are there qualitative differences in the services delivered to Title I students? In terms of class size the data show that Title I students are instructed in slightly smaller classes than regular students. The size of classes varies by grade, but for both reading and math and for all grades, the classes with Title I students are smaller than those with regular students only, with the average difference being about one student out of 19 in reading and one out of 24 in math. In the elementary grades, much of the instruction is given in small groups rather than to the class as a whole. This is particularly true in the first two grades but, for reading, even in the sixth grade, 80 percent of the instruction is in groups rather than the whole class. Title I students receive much more of their instruction in small groups.

The number of students in a class and the size of the instructional group are potential indicators of the quality of instruction. These are both favorable for Title I students. But probably more important are the teachers and the methods used in instruction. The teachers of Title I children tend to have less teaching experience than do the teachers of regular students. This is true of their total years of teaching experience and of their tenure in their present school. However, the teachers of Title I students tend to have had more college courses in instructional techniques and more inservice training. Both groups had similar amounts of total college training. In Report 10 it is shown that the total amount of teaching experience is associated with higher student achievement. While the differences are not large, it is of concern that the teachers of Title I students have less teaching experience than the teachers of regular students.

The setting in which Title I students receive their instruction is quite different from the setting for regular students. For both reading and math, Title I students receive considerably less instruction in the whole-classroom setting from regular teachers. In contrast, they receive more of their instruction from special teachers, teaching assistants and aides, in small groups, both within a small part of the classroom or in some other room. Regular students receive more of their instruction from regular teachers in the regular classroom and they engage in considerably more individual study on their own. The major difference between Title I students and regular students is the difference in the amount of instruction in small groups with instructional personnel other than regular teachers.

Title I instruction frequently takes place in a pull-out setting. Although some have been critical of the use of pull-out settings, our data shows that this setting should be conducive to learning. The pull-out groups are two and a half time smaller than regular instructional groups, and each student has almost three times as much staff time available. In pull-out settings 40 percent of the groups were taught by a CE or specialist teacher with special instructional material or equipment. In the pull-out setting, a larger percentage of the students were 'on-task' than in other settings. Generally, the setting for pull-out instruction seemed superior to that for regular instruction. To us, as researchers, it seems appropriate that the Title I students should receive instruction in small groups but we believe it would be preferable that the instruction be given by the regular teachers, since, as shown in Report 10, students seem to learn more when instructed by regular teachers.

We examined in detail the kinds of activities and approaches used in teaching reading and math to Title I and regular students. There tended to be similar practices in the first two grades but then large differences appeared in the higher grades. In generalizing over the different activities, it appears that both the Title I and the regular students receive instruction in basic subjects in the lower grades, but, as grade increases, the regular students receive instruction in more abstract and advanced materials while the Title I students continue to be taught more basic subject matter. The use of a number of different approaches was examined. In the first grade, both Title I and regular students were most frequently taught reading through 'graded sight phonic analyses,' 'graded letter sound relationships,' and 'literal and implied comprehension.' By the sixth grade the methods used to instruct the Title I students were completely different from those used to instruct regular students. In the sixth grade, the three most frequently used methods with Title I students were the least frequently used with regular students, and the three most frequently used with regular students were the least frequently used with Title I students. For the regular students in the sixth grade, the most frequent methods used were 'literal and implied comprehension,' 'reading in content field,' and 'literary forms and appreciation.' In contrast, the three most frequent methods used with Title I students were 'modified alphabet,' 'self instruction with reinforcement,' and 'student reading own writing.' It is clear that the methods used with Title I students are different from those used with regular students.

There are also differences in the methods used in teaching math. Relative to regular students, Title I students receive more math instruction by 'learning about the structure of number systems,' 'working with math games,' 'working with physical models,' and 'learning about sets.'

Finally, there are data on the uses of teaching materials and audiovisual equipment. Title I students, particularly in reading, tend to receive more instruction from non-textual material and from audiovisual equipment.

It is clear that Title I students receive instructional services that are in addition to, and different from, the instructional services of regular students. But it is not so clear that these services add up to a net positive effect. In theory, receiving more reading and math instruction in small groups from instructional personnel who can devote more individual attention to the Title I student should result in greater learning, but while the Title I student is receiving more reading and math instruction, the regular student is frequently receiving instruction in a different subject or a different setting, but still getting something the Title I student is not. Also, the regular student is more frequently receiving the instruction from a regular teacher with more teaching experience than the special instructional personnel instructing the Title I students.

After the first two grades, the methods and techniques used in instruction for the Title I student and the regular student differ. Title I students tend to be instructed at a more elementary or basic level, while the regular students are receiving more advanced and abstract instruction. The methods used with the Title I students in the higher grades are quite different from those used with regular students. It is not intuitively obvious that the methods used with the Title I students are the best methods that might be used. It is also clear that Title I students' teachers more frequently use non-text teaching materials and audiovisual aids, but from results in Report 10 it is not clear that these materials are helpful; it is possible that they are used because they are available, and that they are available because there is Title I money to buy them. In Chapter V we will examine the extent to which Title I services seem to lead to greater learning.

HIGHLIGHTS OF CHAPTER IV - WHO RECEIVES COMPENSATORY EDUCATION?

There are many kinds of Compensatory Education programs. The Sustaining Effects Study was mainly concerned with Title I of the Elementary and Secondary Education Act, but since Title I operates in an environment that includes other CE programs, it was necessary to consider both Title I and the other programs in evaluating the effects of Title I. Congress mandated the Participation Study and specified that information be obtained on the number of students receiving and not receiving Title I services as a function of, first, the poverty status of the students and, second, as a function of the academic achievement of the students. To obtain the economic status information, home interviews were conducted with a random sample of about 15,000 parents of students in the study. The students all took achievement tests in reading and in math during the fall of the 1976-77 school year to provide the information on academic achievement.

The results show that among students coming from a poverty* background, 40 percent receive CE services** and 60 percent do not, while for students coming from a non-poor background 21 percent receive CE services and 79 percent do not. In terms of the receipt of CE services it is clear that a greater proportion of poor students receive CE services than do non-poor students. However, because there are many more non-poor students than there are poor students, the number of non-poor students receiving Title I is greater than the number of poor students receiving such services (1,690,000 and 1,230,000 respectively). In the same population of students there are about 2,500,000 poor children not receiving CE services and about 12,600,000 non-poor students also not receiving CE. To the extent that the Congress intended Title I and other CE programs to be programs for both the poor and the educationally needy, it seems that there are many poor children who are not served while at the same time there are many non-poor children who are receiving CE services.

However, it is not clear that it was the Congress' intent that Title I was largely to serve the poor; rather it may be argued that it was the Congress' intent to provide services for the educationally needy. Of those students whose achievement is one grade level or more below their assigned grade level (low achievers), 31 percent participate in Title I. Among those above this level of achievement (regular achievers), 10 percent participate. But there are many more regular-achieving students in the nation than there are low-achieving students, so there are about 2,000,000 low achievers not receiving Title I services, while there are 1,300,000 regular achievers who are.

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*See Chapter IV and Report 2 for a discussion of how poverty was defined.

**These figures are for all CE. Generally the trends are the same for Title I and other CE, but there are some differences. For data on these differences the reader should consult Chapter III and the relevant technical reports.

Certain undesirable measurement problems are associated with using grade-equivalent scores, so the data were also analyzed in terms of percentiles. The percentage of students being serviced by CE increases progressively as the achievement percentile decreases. Nevertheless, among students above the national median in achievement level, 4 percent participate in Title I. In terms of absolute numbers this is about 450,000 students. There are about 2,500,000 students below the average who receive Title I services.*

In judging the success of Title I in reaching the intended students, one is faced with the ambiguity of Congress' intent. Some feel that CE programs are primarily for the poor and some feel they are primarily for the educationally low-achieving. It is usually assumed that there is a high degree of relationship between poverty and school achievement, and thus if one criterion is satisfied, the other will automatically be also. This is not the case. The relationship between economic status and educational achievement status is very modest when viewed at the individual student level. If one knows the economic status of a student, one can predict his academic achievement somewhat better than at the chance level, but not by a very large amount (the correlation is .30). The relationship is considerably stronger at the school level (.67). While students are selected for Title I as individuals, they must be in a school having Title I funds. Thus, funding schools in terms of poverty criteria tends to make Title I available to the most educationally needy students.

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*The numbers presented depend on the definition of poverty and achievement level. With different definitions the numbers vary. See Chapter III and Report 2 for numbers using different definitions.

When the joint relationship between poverty and achievement, and selection for Title I are considered, the relationships become more complex. When all elementary school students are considered, then among the poor and low achievers,* 40 percent receive Title I and 60 percent do not; among those who are non-poor but low achievers, 26 percent receive Title I and 74 percent do not; among the poor who are regular achievers, 22 percent receive Title I and 78 percent do not; and among the non-poor and regular achievers, 8 percent receive Title I while 92 percent do not. In terms of absolute numbers it is clear that a large number of students who are non-poor and regular achievers are receiving Title I, about 868,000 students, while there are about 1,626,000 receiving Title I in all the other categories.

What do all these percentages and figures mean in terms of Congress' interest? First, it is clear that in a general way the intent of Congress that Title I funds should go to the poor and the educationally disadvantaged is being met. It is the case that poor students receive Title I services relatively more frequently than do non-poor students; similarly low-achieving students receive Title I services relatively more frequently than do higher-achieving students. But because there are more non-poor students and there are more regular-achieving students, the absolute number of children receiving Title I services is larger among both the non-poor and the regular-achieving students than it is among the poor and lower-achieving. While the general intent of Congress is being met, there are large numbers of students receiving Title I who do not fall within the intended target groups.

There are a number of reasons for this apparent misallocation of services. Most frequently principals and teachers report that they use some combination of teacher judgment and tests to select students for CE services. Both of these methods of assignment are somewhat unreliable and will misclassify some students. Also, within a given school district, some schools will receive CE funds and others will not. When the students in a particular school are selected for CE, some will be selected who are less educationally needy than are low-achieving students in other district schools without CE. Also, some schools can be designated as 100 percent Title I schools and all students will receive CE whether or not they need it. There are also significant regional differences in the distribution of achievement scores. Title I funds are generally distributed to districts based on national poverty criteria, but the selection of students is based on local academic need. Thus, since there are regional differences in achievement, some schools in higher-achieving regions will have the funds to enable them to select students for Title I whose achievement would be too high to be selected if they were in a region populated with lower-achieving students.

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*"Low" and "Regular Achievers" are defined here as being below or above one year below grade level. As discussed later, selection for Title I is based on a different criterion.

Many analysts and administrators reviewing these data note that from the perspective of the national academic achievement, the number of regular-achieving students receiving Title I is so large that the whole selection system should be carefully reexamined. Congress should be more definitive regarding the intent of the Title I program: if it is a program simply for the educationally disadvantaged it will be aimed at a different, but moderately overlapping population. The present selection system results, at the national level, in many children receiving Title I who, from a national perspective, do not need it, and at the same time there are many children who need Title I but do not receive it. The solution to this problem requires a clearer definition of the intent of Congress and probably the funding of a larger Title I program. As will be seen later, Title I does have a positive impact on achievement and providing Title I services to many educationally needy students can raise their levels of achievement. A better selection of students to receive Title I services would help some, but even with the best selection system there are not enough funds to serve all students who are below the national average. However, even at the present level of funding, a perfect selection system would allow the offering of Title I services to all who are one or more years below grade level.

While the relationships among poverty, educational achievement, and selection for CE constitute the major focus of Chapter III, other important findings are related. In terms of selection for CE, Hispanics are selected relatively most frequently, followed closely by blacks, and then somewhat further behind by whites. This appears to be the proper order in terms of what we know about relative achievement. In terms of urbanism, students from large cities and rural areas are, relatively, selected most frequently. This is particularly true for the Title I program. Surprisingly, when all CE programs combined are considered, the suburbs show the highest relative frequency of selection for low-performing students. This is because the suburbs offer a proportionately larger amount of services to students from other than Title I funds. This implies that if a student in the suburbs is low-achieving, the local community or the state will find CE funds to support extra service. In terms of regions of the country, the West and the Northeast have the highest relative selection rates of students for CE services, while the South and Mid-Atlantic have the lowest. However, the South is the highest for Title I but lowest for CE programs funded from other sources. These differences in regional and urban selection rates interact with the source of funding of CE services. National programs interact with state and local programs, and the fairness of distribution of nationally-funded programs depends on whether one believes that one region of the country should benefit at the expense of another because of its relative poverty.

There are sex differences in the rate of selection for CE. Boys receive CE services more frequently than girls. However, this should not be attributed to sex discrimination. It is well known that in the lower grades girls have somewhat higher achievement scores than boys and thus the boys have a somewhat greater need for CE than girls. The differences in selection rates are small, and it seems that the schools are not intentionally selecting students to receive CE services on the basis of gender.

Finally, Chapter III considers how students are selected for CE as reported by principals and teachers. There is a multitude of different methods used, but teachers' judgments and test scores are used most frequently. The chapter closes with a discussion of how a targeting index might be developed. The idea is to develop an index that would tell how well a school or district is doing in selecting students for CE. A number of indices are considered and it is concluded that it is feasible to develop such an index, depending on how comprehensive it should be and how many resources are available for computation. Technical Report 13 contains a table that summarizes the relevant features of each index and indicates how well it fulfills a number of requirements.

HIGHLIGHTS OF CHAPTER V - HOW EFFECTIVE IS COMPENSATORY EDUCATION?

This chapter examines two questions. First, it considers whether Title I students gain relative to a comparison group of similar needy students who do not receive Title I services. Second, it examines the evidence to determine if there are school practices, instructional techniques, staff characteristics, and organizational settings that increased educational achievement.

There is also discussion of how students were classified as 'Title I,' 'Regular Needy,' and 'Regular' students. Briefly, 'Title I' students are selected to receive Title I services, 'Regular Needy' students are students judged by teachers to need CE services but not receiving any, and 'Regular' students are not judged to need CE nor are they receiving any. The method of defining a student's status is not straightforward; it is complicated by the fact that over a period of three years a student may belong to each of the above groups. Because students frequently change from one group to another, the composition of the groups changes, particularly at the beginning of each school year. Because the Title I and Regular Needy groups are composed of relatively low-achieving students, at the beginning of the school year these groups tend to have lost the previous year's higher-achieving students as the better students are 'promoted out' to the Regular group. Similarly, the Regular group tends to lose its poorer students to the Title I and Regular Needy groups because in the Regular group the low-achieving students are replaced by the higher-achieving students from the lower-achieving groups. Because of these changes in group membership there may be an apparent increase in the achievement gap between the groups of Regular students and Title I and Regular Needy students as grade increases. Likewise, the fact that there are fewer Title I students in the higher grades further increases the apparent gap, since the Title I students are generally the lowest-achieving students. If there are fewer Title I students and they are the most educationally needy, then as their proportion of a class becomes smaller the average difference between these Title I students and regular students will increase. Thus, the so-called increasing achievement gap between Title I students and regular students is partly the result of the working of CE policies.

Chapter V examines the evidence for achievement gains based on the data for one school year, and for three-year longitudinal data. Graphs are presented that show the relative growth of Regular, Title I, and Regular Needy students. Title I students in grades 1, 2 and 3 grow at a faster rate for reading than similar Regular Needy students. The Title I students do not grow at quite as fast a rate as the Regular students in grades 1 and 2 but seem to grow at a slightly faster rate in grade 3. For grades 4, 5 and 6 in reading, all three groups seem to grow at about the same rate. Thus we conclude that, for reading, Title I seems to have a positive effect in grades 1, 2 and 3 but not in the other three grades. For math, the picture is considerably more positive. In all grades for math the Title I students improve more than the comparison group composed of Regular Needy students. Furthermore, the Title I students appear to improve at a faster rate than the Regular students, while the Regular Needy students grow at a slower rate than the Regular students. We conclude that Title I services have a positive effect in math at all six grade levels. The results of the three-year longitudinal study generally confirm the results for the first year. A number of different analyses show that the less disadvantaged Title I students benefit from a year of Title I services and are 'promoted out.'

However, the most disadvantaged students usually received Title I services during all three years of the study and did not show relative gains.

There is a discussion of the reasons why Title I may be more effective in math than in reading. It is suggested that learning to read is not limited to the schools. Children practice reading at home, in shopping malls, on the street, most everywhere. On the other hand, math is largely learned and practiced in school. Thus, additional Title I exposure to math is of much greater consequence.

Chapter V also examines the educational practices and other factors that might be associated with improved educational performances. Among the factors investigated were: student background characteristics, the amount and kind of instructional services, the type of school and instructional setting, the characteristics of instructional personnel, the characteristics of the instructional environment, and the characteristics of instructional practices. The effects of these variables were explored by a number of different techniques, such as regression analysis and causal modeling. Generally, no strong relationships were found between any of the school-related variables and increases in achievement. There were some relationships that were statistically significant but not strong enough to clearly guide policy. The most noteworthy findings were:

- Students of more experienced teachers achieve more for in both reading and math.
- The amount of regular instruction and tutor/independent work shows some positive, but modest, effects on achievement growth. In contrast, the amounts of instruction by special teachers or in very small groups does not often contribute to the explanation of achievement growth, and when it does, a negative relationship is observed. This is probably due to the fact that these services are disproportionately received by the lowest potential achievers.

- In both reading and math, temporary disruptions of instruction tend to be unfavorable conditions for learning in the upper grades but not in the earlier grades.
- The frequency of feedback on progress sometimes relates positively to reading and math achievement growth.
- In reading only, a teachers' effort in planning and evaluation shows a positive relationship to achievement growth in some grades.

School principals expressed a very positive attitude toward CE. Teachers expressed both positive and negative attitudes. There was considerable evidence that CE students had a positive attitude toward CE and did not feel stigmatized.

In summarizing this chapter, the evidence indicates that Title I services are positively related to achievement in reading in the first three grades, and that Title I services are positively related to achievement in math in all grades. But just what aspects of Title I services are responsible is not clear. Students who receive instruction from more experienced teachers seem to profit more than those receiving instruction from less experienced teachers. Also, instruction in the regular classroom setting seems to be a positive factor, as does receiving instruction in a setting without disruptions.

From a practical point of view, the implication of the finding that Title I can help students improve their performances in basic skills is that Title I services should be increased so that they might be available to all educationally needy students if our goal is to help all educationally needy students improve their achievement. Since only about half of all the needy students are now receiving Title I services, this would require a very large increase in the amount of Title I funding. A political judgment is required as to whether the amount of gain is sufficient to justify this increased funding, but it is clear that a very large number of children who could benefit from Title I services are not receiving them.

The findings also suggest that educationally needy students should be the ones to receive instruction from the most experienced teachers in a regular classroom setting. At present this tends not to be the case. Title I students tend to receive instruction from less experienced teachers, and not in the regular classroom. While pull-out settings have characteristics favorable to learning, it would probably be better if these same characteristics could be obtained with regular teachers in the regular classroom. These are matters that could be corrected at the local district and school levels.

HIGHLIGHTS OF CHAPTER VI - HOW COST-EFFECTIVE IS COMPENSATORY EDUCATION?

It seems reasonable to many that as more resources are made available for the instruction of low-achieving students, the achievement of the students should increase. One of the assumptions underlying the federal funding of educational programs is that poor school districts are not able to marshall enough local resources to provide the extra services to help low-achieving students to improve their performances. Thus, it is hoped that the federal funds will help improve the performances of these students. We attempted to test these assumptions by investigating the relationship between the amount or cost of resources used and changes in student achievement. The finding is that there is no positive relation between the total cost of the personnel and other resources used in instruction and growth in achievement. Because this finding is contrary to conventional wisdom and the assumption underlying Title I (and many other social programs), it deserves to be scrutinized carefully.

Early studies of cost-effectiveness were usually based on obtaining the total expenditures involved in a CE program and dividing them by the number of participating students. This gives a per-pupil cost, but there are many reasons why this approach gives untrustworthy results. In an attempt to overcome the limitations of this approach, researchers have recently developed a resource-cost model based on the idea of applying a standard price to each service actually received by students in their instruction. This bottom-up approach, as contrasted with the top-down approach, starts with a teacher's report of how much instruction each student receives. Standard prices are developed for each element of instruction given. These prices are uniform for all students and thus ignore actual variations in teacher salaries and the cost of instructional material from one region of the country to another. The basic assumption is that a teacher with a certain amount of education and teaching experience does as effective a job in one location as in another. Thus, a uniform, common metric is developed and used to cost the instruction received by each student. Chapter VII reports the results of applying this resource-cost technique to the SES data. Achievement gains were studied in relation to the cost of instruction. Overall the results show that there is no significant positive relationship between these two variables. For some grades there seems to be a slight positive relationship but it is countered by other grades with slight negative relationships. In Report 7, detailed statistical tests are reported and the overall conclusion is that there are few statistically significant trends and, where they are significant, they tend to be negative. This negative correlation means that the more costly the services a student receives, the less the achievement gain made by the student.

It can be argued that the slightly negative relationships found are due to the fact that more resources are given to the more needy students than to less needy ones. It is argued that the most needy students will have more difficulty in improving their levels of achievement than less needy students and thus the negative relationship found is determined by the nature of the students receiving the more costly services rather than the ineffectiveness of the increase in services. This idea was investigated and it was found that lower-achieving students do receive more costly services than higher-achieving students. While the relationships are not strong, they are at least large enough to support the idea that the negative relationship between cost of service and achievement gain is a function of the achievement level of the students being served.

While it is possible to offer explanations for the negative relationship, it is still important to ask why a fairly strong positive relationship was not found. The idea that increasing the funding, and thus services to needy students, will lead to increased achievement is so pervasive and fundamental to federally-funded programs that these findings need to be most carefully examined for faulty analysis. One way of checking the possibility that the results are due to a faulty resource-cost model is to undertake the same analyses using total hours of instruction received by the student. The use of hours of instruction received is independent of any cost model and in a sense is more basic than a cost-effectiveness analysis. Yet the results are the same as those found with the resource-cost model.

The resource-cost model used has been criticized by some researchers as faulty. We believe these criticisms are not valid; nonetheless, the importance of the relationship between the cost of services received and gains in achievement is such that we recommend that an independent analysis of the SES data be undertaken. We believe it is important either to confirm the results reported here or to clarify the methodological problems in such analyses.

HIGHLIGHTS OF CHAPTER VII - WHEN AND FOR HOW LONG SHOULD STUDENTS RECEIVE COMPENSATORY EDUCATION, AND WHAT HAPPENS TO THE ACHIEVEMENT OF STUDENTS WHEN THEIR COMPENSATORY EDUCATION SERVICES ARE DISCONTINUED?

Opinions differ about the best grade in which students should receive compensatory education. Some have thought that compensatory services should be concentrated in the primary grades, particularly in the first and second grades. This was based on the idea that if students received assistance early, they could catch up with students entering at a higher achievement level. Others have argued that additional services should be available at whatever grade the student demonstrated a need for the services. We examined this question using several different methods. The result was that there is no one grade where CE is most effective, but there is evidence that it is most effective in the primary grades.

Another concern has been the optimum length of CE services. Some have felt that one year's worth of services should be sufficient, while others have urged that the same child should receive services for as long as needed. Again we could find no evidence to support either position. Rather, there is an interaction between the level of achievement of the student and the benefit derived from CE. Students who are selected for CE but achieve at a relatively high level seem to benefit from one year of CE services, while very low achieving students do not seem to benefit from services at the intensity they are receiving them. Thus we cannot say that there is a general optimum length of CE services.

There has been considerable concern over what happens to students when their CE is discontinued. Particularly in Title I, the goal is to serve the most needy students. From year to year, the particular students to be served will depend on a number of factors such as the availability of funds for CE programs in specific grades and subjects. When students whose achievement levels increased during the year are considered for services the next year, it may be that they have progressed sufficiently, in comparison to other students with lower achievement levels, to make them no longer the most needy. It has been argued that, as soon as these students begin achieving at higher levels, they are promoted out of CE programs and thus lose the impetus that has built up and then may fall back to previous lower levels.

In the Sustaining Effects Study we examined three questions related to this problem. First, we studied the frequency of changes in CE participation of students from year to year to see if it was frequent enough to merit attention; next we determined whether or not there really was a change in the instructional services received by students once they had lost their CE status; and finally, we examined whether those students losing their CE services continued to achieve at a relatively higher level or reverted to the lower level characteristic of CE students. The findings are relatively clear. Among CE students there is considerable change in status from year to year. Among

Title I students, about 40 percent of the students who received Title I services in one year will not receive Title I services the next year. There is even greater turnover in other programs. For the other federally-funded programs, the turnover figure is about 80 percent, and for state and local programs it is about 65 percent. Thus it is clear that there is a large amount of student turnover from year to year. Next we examined the hours and costs of instructional services offered to regular students, to students whose CE programs continued from one year to the next, and for students who had received services in one year but had their services discontinued for the second year. The results show quite clearly that regular students receive services costing considerably less than CE students and also that the students who had received CE services the previous year, but were not now receiving them, got services that cost about the same as the cost of services for regular students, rather than the cost of services for CE students. Thus, we know that there are many students who have their services discontinued, and that the services they receive subsequently revert to those received by regular students. What happens to their achievement levels as a result of this change? The results indicate that those students who no longer received CE services since they were no longer qualified because of relatively high achievement continued to maintain their achievement growth during the next year. In other words, there do not seem to be deleterious effects resulting from the discontinuation of CE services. The policy implication of these findings is that there is really no great problem associated with the turnover of CE students who lost services because of high achievement. While it may be wise to give school personnel flexibility to handle the cases of individual students judged to remain in need of CE services, there is not a national problem of CE students being 'promoted out' only to fall back because their CE services were discontinued.

Although the Sustaining Effects Study was not designed to follow students into high school, it became apparent in the later stages of the study that it would be desirable to try to obtain data on students in high school, to see if we could detect any long term, sustained effects of CE. A small sample of students was followed into the seventh, eighth, and ninth grades. The students were tested for reading and math achievement, and information was gathered on the courses they took in junior high-school. We found no evidence that achievement effects of CE in the elementary grades carried over into junior high-school. However, the data available for making a definitive test were not available. The former Title I students took more remedial courses in junior high-school than other students who had not been Title I students. We also found evidence that the students' socio-economic background still played an important role in achievement levels even as the students moved through the junior high-school grades. We believe this portion of the study should be viewed with caution because of the difficult nature of the problem investigated and because of the less than ideal data available.

HIGHLIGHTS OF CHAPTER VIII - WHAT HAPPENS TO STUDENT ACHIEVEMENT OVER THE SUMMER, AND IS SUMMER SCHOOL EFFECTIVE?

All groups of students show achievement growth during the regular school year. But what happens to that growth over the summer? To what extent do students continue to mature even though they receive no formal instruction? We have already seen that during the regular school year the rate of growth for CE students is roughly equivalent to that of regular students. Some have suggested that during the summer regular students continue to improve due to informal learning experiences, but that CE children lack both the motivation and resources to engage in these informal learning activities. However, the evidence is less than clear-cut. Some have argued that, for all students, achievement suffers an absolute decline over the summer; other evidence suggests that CE students suffer a loss relative to regular students. It has been further suggested that among CE students those who achieved the highest gains during the regular school year suffered the sharpest losses during the summer.

Based on these ideas, it has been suggested that summer school has an unusually important role to play. If CE students have learning experiences during the school year that enable them to achieve more, it is important that efforts be made to continue or maintain the benefit, and summer school seems a reasonable way of doing it. Since summer school classes are available to only about half of all students, it has been argued that their availability should be increased, particularly so that they would be available to CE students.

The question of whether achievement levels increase or decrease over the summer has implications for both the evaluation of CE programs and for the wisdom of funding summer schools. Starting in 1976, research indicated that there was an absolute loss in achievement over the summer and that CE students lost relatively more than regular students. This research was influential in shaping federal thinking about the whole question of the intellectual growth of CE students and the Executive Branch's position on legislation to increase support for summer schools. Since then several reports have produced data that seemed to refute the earlier conclusions.

The Sustaining Effects Study provided a large amount of high-quality longitudinal data to evaluate these contentions. The results are quite clear. For reading, there is not a summer loss but a consistent gain for all grades and all kinds of students. For math, there is also a summer gain, but it is not as large as it is for reading. It is reasonable to suggest that in reading the students have considerable exposure to reading material over the summer, while for math there is less opportunity for summer learning. The earlier research had suggested that there was a relative loss for CE students in comparison to regular students. Here the SES results are less clear-cut. For the non-CE students in reading there is a decrease in the rate of growth over the summer in the lower grades but very little, if any, in the higher grades. For the CE students in reading there is a similar decrease in the lower grades, but considering their slightly slower rates of growth during the regular year, there may be slight summer gains relative to non-CE students. In the higher grades, the CE students in reading drop off slightly more than their non-CE peers. For math, the picture is somewhat different. Both the CE and the non-CE students show a lessening in the rates of growth over the summer at all grades. The change for CE and non-CE students is very similar with, perhaps, slightly larger drops for the non-CE students. In summary, the results show that there may be a very slight overall relative summer drop for CE students in reading, but not in math. Neither the SES data, nor other data reported by NIE, give credence to any large or particularly significant summer loss.

It had also been proposed that CE students who were high achievers during the school year lost more than low achievers, where achievement was defined in terms of the level of performance, not in terms of gains during the school year. The SES data show that low-achieving students continue to grow over the summer and at about the same rate as during the school year, and there is no significant difference between CE and non-CE students. On the other hand, high-achieving students grow at a faster rate during the school year. For reading, non-CE high-achieving students continue to grow over the summer, but high-achieving CE students show a loss, particularly a relative loss. For math, both CE and non-CE high-achieving students show a loss over the summer, but the CE students have a larger loss.

The importance to be attached to this relative loss for high-achieving students depends on where the emphasis for CE resources should be placed. There are about six times as many CE students below the national median in achievement as there are above it. If the goal is to help the vast majority of CE students, can one justify exceptional resource expenditures for high-achieving CE students on the grounds that they lose more over the summer than their non-CE peers? On the other hand, low-achieving CE students gain over the summer. Perhaps low-achieving students would gain more if they had special summer services. It has also been argued elsewhere that those CE students who are high gainers during the school year suffer high losses during the summer. According to this argument these students need the stimulation of intensive instruction to achieve high gains and, lacking such stimulation during the summer, they lose more than those having smaller achievement gains. This idea was tested by separating those who had high regular school-year gains and comparing them with students who had relatively small gains. Comparisons were made for both individual students and for school classes having high and low gains. The results show that indeed those who had high school-year gains had quite high summer losses. But, at the same time, those who had low school-year gains had high summer gains. In other words, the result demonstrates the regression-to-the-mean phenomenon. Because of measurement unreliability, the individuals at the extremes of both ends of a distribution tend to move toward the mean on any subsequent measurement. Thus, the overall results are largely due to statistical artifact and do not represent a real difference in gains or losses between high and low gainers.

From this wealth of data we conclude that there is no absolute summer drop-off, and that there may be a slight, but not particularly significant, relative loss for CE students in comparison to non-CE students. The more detailed analyses of high and low gainers, and of members of high-gain and low-gain projects, leads us to believe that reported relative summer drop-off is more of a measurement artifact than a reality.

The practical implications of these findings regarding the "summer drop-off phenomenon" are that it is not something that requires any special action or concern. Our findings, and those of others, do illustrate, however, that policy makers need to be very careful regarding the soundness of reports and the appropriateness of any actions based on them. In hindsight, it is difficult to understand why some policy makers placed so much confidence in reports based on quite limited data which was expressed in a poor metric.

Some have suggested that students who have not performed well during the regular school year should go to summer school as an additional learning experience that would help them in the coming school year. It has been thought that this might be particularly important for CE students who are having difficulty keeping up with their peers and, if high-achieving CE students lose a large amount of their school-year gains, it would be particularly important that they attend summer school to help mitigate such losses. Of course, summer school serves functions in addition to instruction in basic subjects. There are recreational and special-interest classes that many students find attractive. Summer school can also serve as a safe summer haven for children whose parents are working or need to be away from home. Summer school serves many purposes in addition to instruction in reading and math.

About half of all students have summer school available either at the students' regular-year school or elsewhere in the school district, with larger schools more frequently having summer programs. Schools with a high concentration of minority students are more likely to have summer programs. About two-thirds of all summer schools derive some support from Title I funds, but only a quarter are completely supported by Title I. The average length of summer sessions is five to six weeks, which is 25 to 30 school days. The amount of reading and math instruction is not large. On the average, there are about 17 hours of reading instruction and about 14 hours of math instruction. There is no difference in the amount of instruction as grade level increases, nor do Title I students receive more instruction than others. However, CE students are more likely to attend summer school than non-CE students. By grade, the percentages of CE students who attend range from 21 to 32, while the percentages of non-CE students who attend range from 7 to 20. In terms of judgment by teachers of need for CE services, twice the percentage of 'needy' students attend summer school than the 'not needy.' In terms of achievement test scores, students attending summer school score considerably lower than those not attending, and this is true among both CE students and non-CE students.

In judging the effectiveness of summer school, it is not sufficient to show that students who attend summer school increase their performances over the summer. Rather, one must compare students who attend summer school with similar students who do not. First, we examined the summer growth of all the SES students who attended summer school and compared their growth with that of students who did not attend. For both reading and math, the students who attended summer school grew at the same rate as those who did not attend. Since these comparisons lump all students together, it can be argued that the results would be different for CE students, so we made two other comparisons. In one case we compared only CE students who attended summer school with CE students who did not attend. In the other sample, we compared Title I students who attended summer school and were from schools offering summer school, with Title I students who did not attend summer school and were from schools which did not have summer school. In neither case was there any evidence that students attending summer school performed better the next fall than those who did not attend summer school.

All the analyses from the SES data discourage the idea that summer school, as it is now conducted, is an effective mechanism for improving the performances of CE students. As we compare students who attended summer schools with those who did not attend, we simply find that present summer schools are not effective in raising basic achievement test scores. What effect should be reasonably expected from four or five weeks of instruction of less than an hour a day for reading or math? When children are rapidly maturing in their reading skills and can have summer reading experiences without summer school, should we expect summer-school-related reading gains? In the data there is a hint that summer school in the higher grades may be effective in math, and, in comparison to reading, there is less summer growth in math in the higher grades. Probably there is less opportunity for summer math-related experiences than there is for reading.

We should not construe these results to mean that summer school cannot be effective. If summer school were longer, had more hours per day devoted to basic subjects, and had experienced regular teachers, it might well result in achievement gains, but that is still to be demonstrated. Indeed, we will never know how effective summer school can be until a careful study is made of summer schools that are designed to give intensive instruction in the basic reading and math skills. If such summer schools proved effective, then there would be a sound educational basis for legislation to provide funds for similar summer schools for CE students.

HIGHLIGHTS OF CHAPTER IX - WHAT CLASSROOM PRACTICES INFLUENCE LEARNING?

We developed a model of the elementary education process based on information previously analyzed and our understanding of the education process. We called this the rational model and it consisted of the following factors: spring achievement scores and fall achievement scores and the gain between fall and spring, the socio-economic background of the students, their opportunity-to-learn in the classroom, the instructional practices used by their teachers, the resources available for their instruction, the characteristics of the school/staff, the coordination of instruction, and the level of the principal's instructional leadership. Using the techniques of causal analysis we tried to develop an understanding of the relationship between these factors and how they affected student learning.

In studying the relationships, we were particularly interested in the way each of the factors related to achievement and achievement gains. Fall achievement was most closely related to spring achievement, and the gain in achievement was related in complex ways to the remaining factors. The relationship of socio-economic background to achievement was modest and the relationship to achievement gain was still smaller but positive. Opportunity-to-learn was broken down into three subfactors: amount of time available for learning, the amount of on-task behavior, and the overlap between curriculum content and test content. The relationship between opportunity-to-learn and achievement is quite high for reading and math in the second grade for the poorer schools but not for the higher achieving schools; it is quite high for both reading and math at the fifth grade for all schools. The relationship of opportunity-to-learn to achievement gain is more moderate but still quite positive. In the model, instructional practices operate through opportunity-to-learn to influence achievement. A number of different instructional practices were found to be positively related to opportunity-to-learn. Resources also operate through opportunity-to-learn in influencing achievement. Smaller student/staff ratios were associated with higher percentages of students on-task, higher percentages of student time devoted to instruction, higher quality of classroom management, and higher level of direct student supervision. However, resources-available was not related to achievement, except in fifth grade math where the relationship was quite strong. Staff characteristics also operate through opportunity-to-learn. Years of teaching experience is somewhat related to achievement gain. Teachers' job satisfaction is fairly strongly related to achievement level and to achievement gain. Similar relationships were obtained for the characteristics of school principals. Coordination of instruction also operates through opportunity-to-learn and is fairly positively related to both achievement and achievement gain. Principals' instructional leadership should influence opportunity-to-learn, but it was found that there was a negative relationship between principals' instructional leadership and student achievements. It is believed that principals in poorer, low achieving schools exert stronger instructional leadership and thus, the relationship found is explainable in terms of the schools in which the principals work.

Based on these relationships and the interrelations between each of the factors, the data were fitted to the rational model of the education process that had been developed. It was found that the rational model formed a good basis for modeling the educational process, but the actual process was considerably more complicated than the rational model had postulated.

HIGHLIGHTS OF CHAPTER X - WHAT IS THE HOME ENVIRONMENT OF ELEMENTARY SCHOOL CHILDREN?

So far we have been largely concerned with the school experience of children, but to understand the child's total learning experience we should also look to the child's home. In connection with the Participation Study, we interviewed 15,000 parents and asked a number of questions about the home environment and particularly home-related learning activities. It was found that the usual home of an elementary school child is a two-adult family home, with parents about 35 years old; they are white, living in a single family dwelling, and have graduated from high-school. While these are the usual characteristics, there are from 20 to 35 percent of the children who come from homes with different characteristics. At home the usual child spends about two hours a day playing, an hour doing chores, about two hours watching TV, an hour reading for pleasure, and an hour doing homework. Most of the children come from homes where the parents are involved in school related extra-curricular activities, and most of the parents attend parent-teacher conferences at least once a year. Over 75 percent of the parents rate the quality of their children's schools as excellent or good. Almost all of the parents expect their children to graduate from high-school, and over 25 percent expect them to graduate from college.

When the home environment of Title I students is compared to that of regular students, the two home environments are quite similar. It will be remembered that a large number of Title I students come from non-poor homes. However, there is a slight tendency for Title I students to come from homes with less well-educated parents, from minority homes, from homes with a somewhat less intellectual environment, and with somewhat lower expectations regarding school attainment.

These findings remind us of the number of factors in addition to the classroom that influence a child's learning environment. While the above figures are stated in terms of the typical, or usual, child, the data also remind us of the great diversity of background from which children come. Also, the data emphasize the relatively high regard in which parents hold the schools their children attend. This is in quite marked contrast to the picture painted in some of the media. While there certainly are individual parents who feel their children's schools are poor, and that their children are not learning much, these are far from the typical finding. The high regard parents have for the schools and the high expectations they have for their children is more encouraging than we are often led to believe.

HIGHLIGHTS OF CHAPTER XI - WHAT ARE THE CONTRIBUTIONS OF BACKGROUND AND SCHOOLING TO STUDENT ACHIEVEMENT?

It was usually assumed that both schooling and background factors contributed importantly to the achievement of students. However, with the publication of Coleman's Equality of Educational Opportunity, the question was raised as to whether or not schooling made much of an independent contribution to children's achievement. With the detailed data available in the Sustaining Effects Study on both the student's home background, the characteristics of the schools, and the learning experiences in the schools, it was possible to examine the relative contribution of socio-economic background and schooling. Three different composites were formed for: Student Socio-Economic Background, School Characteristics, and School Learning Experience. The relationship between these and student achievement was explored using the techniques of casual analysis. It was found that while background characteristics were important determinants of achievement, the school learning experiences were also important, particularly in the early grades. The fact that the relationship of level of performance from one grade to the next is lowest at the beginning grades indicates that there is a greater possibility of influencing future achievement in the first and second grades. Also, it seems that socio-economic background has relatively little direct influence on final achievement, but rather that its influence is indirect, through initial achievement, school characteristics, and school learning experiences. These facts tend to point to the importance of schooling, particularly in the early grades.

CHAPTER II. INTRODUCTION

Summary

This introductory chapter starts with a short history of the Sustaining Effects Study. Next is a discussion of the overall design of the study and of the way in which the sample was selected. Then there is a description of the instruments (tests, questionnaires, forms, etc.) used to collect data. This is followed by a short consideration of how the data were collected and analyzed. The in-depth study of high-poverty schools is described. Finally, there is a list of the reports issuing from the Sustaining Effects Study.

A SHORT HISTORY OF THE SUSTAINING EFFECTS STUDY

In March 1975 the U.S. Office of Education issued a Request for Proposal entitled "A Study of the Sustaining Effects of Compensatory Education on Basic Cognitive Skills." The project soon became known as "The Sustaining Effects Study (SES)." The study was motivated by two major factors: one a mandate from Congress and the other the educational community's concern over the effectiveness of compensatory education (CE). The Introduction to the Request for Proposal said,

> "A near decade has passed since Congress enacted the Elementary and Secondary Education Act (ESEA) which authorized the Federal Government to join hands with State and local education agencies in a partnership designed to enhance the education of educationally disadvantaged children in areas with concentrations of children from low income families. During this period and under the authority of this legislation almost fourteen billion dollars have been made available. These funds have affected the school lives of six to seven million children every year in myriad ways. The evaluation requirements of this legislation have helped to create a national concern for the benefits that children derive from their years of schooling and for the costs of these efforts.
>
> Recently Title I of the Elementary and Secondary Education Act of 1965 has been extended and modified in many important ways. In particular, the Educational Amendments of 1974 (P.L. 93-380)

> direct the U.S. Commissioner of Education to expand his efforts to describe the actual and potential recipients of Title I services and to evaluate the effects of such participation. The evaluative study proposed herein is both a response to these new requirements and an outgrowth of prior experience in evaluating this program."

The Educational Amendments of 1974 also instructed the National Institute of Education to undertake a series of studies which became known as "the NIE Compensatory Education Study." NIE was authorized to spend fifteen million dollars on those studies and entered into a number of contracts to study different aspects of Title I compensatory education. A list of the studies is given in the NIE Interim Report (22). In addition, the Department of Health, Education and Welfare and the Department of Commerce investigated ways in which poverty indexes could be updated more frequently than every ten years through the census. Their report, "The Measure of Poverty" (32), shows the impact that alternative methods of estimating poverty would have on funding for different geographic regions. This study and the NIE studies have now been published (see (23) for the final report on the NIE studies).

Much of Congress' concern regarding the effectiveness and operation of Title I stemmed from several evaluation studies which cast doubt on the effectiveness of compensatory education. Wargo, et al. (35) reviewed a number of evaluations conducted in the first five years of Title I and concluded that there was little evidence that Title I had a positive impact on participating students. Subsequent to that report, the Office of Education sponsored the Compensatory Reading Study (31). While the results were more encouraging, they were limited in the number of grades studied and in the length of exposure of students to compensatory services.

The first year of the SES (1975-76) was devoted to planning; to selecting the sample and to persuading schools to join the study; to the selecting, developing, and clearance of instruments; and to the formation of various advisory groups. Data collection started in the fall of the 1976-77 school year and continued for three successive years.

THE PURPOSE OF THE SUSTAINING EFFECTS STUDY

The Sustaining Effects Study is concerned with a number of issues; there are two major policy issues and five secondary issues. The two major issues are:

1) Who receives Compensatory Education? Among children coming from different economic strata, how many receive Title I, other federal, state, or local CE services? Similarly, among children performing at different achievement levels, how many receive Title I, other federal, state, or local CE services?

2) How effective is Compensatory Education? Do those students receiving CE services benefit from such services? What are their performance levels relative to students who do not receive CE services? Similarly, what are their performance levels relative to students who are judged to need CE but who do not receive CE services?

Secondary to these two issues are a number of related questions:

3) What is Compensatory Education? Frequently we speak of Title I programs as though they had a cohesiveness of content or method of instruction. To talk about the effectiveness of CE, we should know what CE is. How does it differ from the instruction children would have received if they had not been selected for CE? How does it differ from the instruction received by students not receiving CE who are in schools where CE is offered?

4) What is the nature of the home environment of elementary school students and how is it related to school environment? Questions 2 and 3 above are concerned with school instructional programs and their effectiveness. Question 4 investigates the relationship of home environmental factors to school achievement. How is school achievement related to such factors as parents' educational and economic status, intellectual stimulation in the home, homework, and parents' involvement with the school.

5) What happens to the achievements of students when their CE services are discontinued? CE services are discontinued for a number of reasons. After receiving CE services some students improve to such an extent that, relative to other needy students, they are no longer eligible to receive CE services. Other students have CE services discontinued for administrative reasons, such as their new classes do not offer such services. Still others lose CE services because their schools no longer offer CE services. If students have been receiving CE services, but these services are discontinued due to one or another of the above reasons, what happens to their achievement in subsequent years?

6) Is there an optimum duration and period for receipt of CE services? It is sometimes argued that CE students need CE services throughout their elementary education. Others believe that concentrating services in the first or second grade is most beneficial. Still other periods or durations receive support. What is the optimum time for and duration of CE services?

7) What happens to student achievement over the summer and is summer school effective? Do regular and/or CE students experience an absolute or a relative change in achievement over the summer? Is summer school effective in increasing the achievements of regular and/or CE students?

THE DESIGN OF THE SUSTAINING EFFECTS STUDY

To obtain answers to the policy questions it was necessary to obtain a large amount of data through a very complex design. As initially planned the Sustaining Effects Study consisted of five* substudies, which were:

1. The Longitudinal Study. In the Longitudinal Study, educational achievement was assessed in the fall and spring for three consecutive years. The children took achievement tests in reading and math, a functional literacy test, and a measure of attitudes toward school and toward themselves as students. The amount and nature of instruction in reading and math was determined for each student four times during the school year. In addition, teachers and principals reported on their practices of instruction. Thus, it was possible not only to assess student growth over a three-year period, but to relate this growth to the kinds and amount of instruction being received.

2. The Successful Practices in High-Poverty Schools Study. This study identified and described the instructional practices and contexts that appear to be effective in raising the reading and math achievements of educationally disadvantaged students. In the longitudinal study data were obtained by formal tests, questionnaires and schedules. In the High-Poverty Schools Study, these data were supplemented by 'in-depth' or ethnographic material obtained from 55 high-poverty schools that were a part of the sample of the Longitudinal Study.

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* Another substudy was added later and involved following a limited sample of students into high school.

3. The Participation Study. The purpose of the Participation Study was to determine the relationships among economic status, educational need, and instructional services received. Data on the educational achievement of the students and the services they receive were obtained in the Longitudinal Study. Measures of economic status were obtained in the Participation Study. A random sample of over 15,000 students was drawn from the schools and visits were made to the homes of these students. During the visits, information was collected on the economic level of the home and on the parents' attitudes toward their children's schools and learning experiences. Thus, the level of student achievement and services could be related to the economic level of and academic support in the home.

4. The Cost/Effectiveness Study. Information was obtained on the resources and services to which each student was exposed during reading and math instruction. Cost estimates were generated on the basis of this information. Because achievement was determined in the Longitudinal Study, it was possible to relate educational effectiveness to the cost of each program.

5. The Summer Study. The Sustaining Effects Study also examined the effectiveness of summer-school programs. Information about the summer-school experiences of the students was combined with other data from the Longitudinal Study. The amount of growth over the summer was determined, as was the effect of attending summer school.

THE SAMPLE FOR THE SUSTAINING EFFECTS STUDY

The sample for the Sustaining Effects Study was not ideal since it had to meet two somewhat conflicting objectives. For the Longitudinal Study it was desirable to have a sample of schools and students with a wide variation in the variables to be studied, such as the kinds of schools, the extent of CE, the nature of instructional practices, the kind of school leadership, the abilities of the children, and the level of the funding. On the other hand, the Participation Study required that projections be made for the nation's schools regarding the number of students receiving CE services, such as Title I. It was also necessary in the Participation Study to report the number of students at various poverty levels who were receiving CE and to find the number of children at various levels of academic achievement who were not receiving CE services. Since the federal government was funding

Title I programs at a level of about three billion dollars a year, it was particularly important that the study be able to describe the effectiveness of Title I activities. To meet these requirements, three different samples were formed: a Representative Sample, a Comparison Sample, and a Nominated Sample.

The Representative Sample. The Representative Sample was drawn to be representative of the nation's schools. It was a stratified, random sample. Three stratification variables were used, namely: geography, size of the school district, and a district poverty index. The technical details describing how the sample of 243 schools was drawn are reported in Technical Report #1. In that report there are a number of tables showing comparisons between the characteristics of the Representative Sample of schools and population estimates derived from other sources. From these comparisons, and from the sampling procedures used, it is concluded that the Representative Sample allows quite accurate projections of the characteristics of the nation's elementary school students.

The Comparison Sample. In trying to assess the effectiveness of CE it would be desirable to be able to compare the achievements of CE students with other similar students who were not receiving CE. We were able to locate 29 schools situated in high poverty areas that were not receiving CE funds. These form the Comparison Sample.

The Nominated Sample. Because one of the major purposes of the Sustaining Effects Study was to determine the effects of Title I, it was essential that the total sample of students contain a large number of Title I students. Another purpose of the study was to determine those teaching practices which seemed particularly effective. Thus a Nominated Sample was formed which consisted of 43 Title I schools that were thought by state departments of education, the U.S. Office of Education, and other agencies, to be particularly good examples of effective CE practices.

In the first year of the study there were 329 participating schools having about 120,000 students. As will be described later, data were obtained on why students in each school; thus there are data on regular students, Title I students, students receiving other CE, affluent students and poor students, high-achieving and low-achieving students, students with different racial backgrounds and, in short, all the different kinds of students that exist in the nation's elementary schools. (There were some exclusions; excluded were schools with instruction largely for handicapped students, students in bilingual programs, students in English-as-a-Second-Language programs, etc. These exclusions are described in Report #1.)

Originally it was planned to continue the study with all 329 schools throughout the three years of data collection. However the full funding of the project was not available during the second operational year of the study, which resulted in a reduction in the size of the Representative Sample. During the first operational year we were able to collect all of the data needed to make the national projections required by the Participation Study. Since the analytical methods involved in the Longitudinal Study do not depend on strict representation, but rather on maximum variation in the variables being studied, it was decided to drop some schools from the Representative Sample and retain the other samples intact. Even though the Representative Sample was reduced by 60 percent it still remained a remarkably representative sample. Of the 120,000 students in the first operational year, about 70,000 remained in the study during the second year. Readers interested in the technical details of the sample should refer to Reports 1 and 13.

THE DATA COLLECTED AND INSTRUMENTS USED

To undertake a study as diverse as the Sustaining Effects Study it was necessary to collect information about the students, the kinds of instruction they received, their teachers, their school principal's philosophy of instruction and administrative practices, and descriptive material regarding the school district. Table II-1 lists the major instruments used in the Longitudinal Study, what was described by each instrument, the person completing it, the frequency of administration, and the month during the school year in which it was completed. Most of the instruments used are compiled in Report 9A and the psychometric properties of the instruments are given in Report 9.

Each fall and spring students completed three instruments: The Comprehensive Tests of Basic Skills, a Practical Achievement Scale, and a Student Affective Measure. The Comprehensive Tests of Basic Skills were administered to determine the students' achievement in reading and math.

There has been considerable criticism of standard achievement tests. It is sometimes claimed that they are biased against minority or poor students and also that they tend to measure academic subjects that are unrelated to real life situations. In an attempt to overcome the criticism of the academic nature of achievement tests, we developed a 'functional literacy' test, that presented pictorially a number of situations that children commonly encounter in their everyday lives. While viewing each picture, students were asked questions about the situations pictured. This test involved both reading and math problems set in the context of practical situations. It was administered to all fourth-, fifth-, and sixth-grade students. Each student also completed a measure of attitudes toward school and toward reading and math. It turned out that the scales of this instrument were so highly interrelated that it was sensible to use only the total scale score.

Once a year the teachers filled out a questionnaire. The first part of the questionnaire asked for demographic and general information. A second part was for reading or math and asked about instruction in that subject area, how students were grouped, how lesson plans were used, how instructional materials were used, what instructional methods were used, etc. Similarly, each principal reported on a set of demographic questions, as well as upon

Table II-1

The Instruments Used in the Longitudinal Study

Instrument Name	Describes	Completed by	Times Per Year	Month Administered
Comprehensive Tests of Basic Skills	Student	Student	2	Sept/Oct Apr/May
Practical Achievement Scale	Student	Student	2	Sept/Oct Apr/May
Student Affective Measures	Student	Student	2	Sept/Oct Apr/May
Student Background Checklist	Student	Homeroom Teacher	1	March*
Summer Activity Slipsheet	Student	Student	1	Sept/Oct
Compensatory Education Roster	Student	School Coordinator	1	March
Student Participation and Attendance Record	Student	Homeroom Teacher	4	Nov Jan Mar Apr
Student-Teacher Linkage Roster	Student/Teacher	Homeroom Teacher	2	Nov March
Teacher Questionnaire, Section A	Teacher/School	Teacher	1	February
Teacher Questionnaire, Section B	Reading Program	Teacher	1	February
Teacher Questionnaire, Section C	Math Program	Teacher	1	February
Principal Questionnaire, Section A	Principal/School	Principal	1	February
Principal Questionnaire, Section B	School	Principal	1	February
District Characteristics Questionnaire Section A	District	Superintendent	1	February
District Characteristics Questionnaire, Section B	Title I Program	Superintendent	1	February
District Expenditure Information Questionnaire	District/School	Business Manager	1	February

*Oct/Nov for the first year of data collection.

his or her philosophy of instruction, attitude toward discipline, efforts at coordination of instruction, and similar items. The principals also described their schools in terms of size, grade range, sources of funding, class assignment practices, parent participation, and staff training. Likewise, the district superintendent and the business manager completed questionnaires describing district instructional policies and expenditures.

Two very important instruments were the Compensatory Education Roster and the Student Participation and Attendance Record. At each school the Local Coordinator completed the Compensatory Education Roster by indicating for each student whether or not the student was designated to receive CE funded by Title I or other federal funds, by state funds, and/or by district or private funds. This roster was important because it allowed us to classify students in terms of their CE status. A Student Participation and Attendance Record was filled out by each student's teacher, for reading and for math; it reported the number of hours of instruction the student received in reading or math during a 'typical' week. The teacher also reported on the size of the instructional group and the person giving the instruction (regular teacher, special instructor, aide, tutor, etc.).

The Student Background Checklist gives information on such items as age, sex, race, previous education, grade, parent's education, parent's participation in school activities, student's participation in school lunch programs, and receipt of special services. The Summer Activities Slipsheet obtained information from the student on activities during the previous summer, such as whether or not the student went to summer school, to camp, took a trip, etc. It also inquired about reading activities during the summer. Interested readers should refer to SES Reports 9 and 9A for the psychometric characteristics and exact items contained in each of the instruments described above.

Data Collection. Because the amount of data to be collected was large and the amount of time involved was long, special steps were taken to assure that quality data would be obtained. As soon as a school agreed to participate the principal was asked to appoint a Local Coordinator who would be paid by SDC for his or her services. Frequently the principal acted as the Local Coordinator but at other schools the Local Coordinator might be the Title I director, the curriculum coordinator, or some other staff member. During the summer of each year a training program for Local Coordinators was held which included instruction on the procedures required in filling out the forms, administering tests, maintaining confidentiality, securing cooperation of the teachers, returning material to SDC, and similar matters.

Special steps were taken to assure confidentiality. Number-name identification rosters were retained at the school so SDC had no record of the names of any of the students in the study. Because of these efforts to maintain confidentiality, particular attention was paid to the maintenance of the linkage numbers for each student from year to year and also to link the students' numbers with their teachers' numbers.

Data Collection in High-Poverty Schools. It is often argued that information from formal tests, questionnaires, and standardized forms do not give a real understanding of the capabilities of students or of the school or institutional settings. Certainly the more intimate details of classroom instruction are not captured. In an attempt to overcome this problem, 'in-depth' data were collected at 55 high-poverty schools. High-poverty schools were sought because they had the highest concentrations of CE students, the students with whom the Study was most concerned. Teams of two observers visited the 55 schools twice. The purpose of the first visit was to become acquainted with the school organization, and to have a preliminary meeting with the teachers whose classrooms would be observed. The second visit lasted for two weeks and involved the collection of information in a number of areas including instructional practices in the second and fifth grades. At each school a lengthy interview was conducted with the principal and each of the involved teachers. Classrooms were visited and the way in which instruction was conducted was noted. The teaching techniques used were recorded. Periodically a count was made of the number of students exhibiting on-task behavior. Much of the material was recorded on prepared forms, but lengthy narrative descriptions were also recorded on audio tape. The data collected by the in-depth techniques were combined with the more traditional data that had been collected for the Longitudinal Study and the results are reported in Technical Report 16.

THE SUSTAINING EFFECTS STUDY REPORT SERIES

The detailed results of the Sustaining Effects Study are contained in a series of reports. These reports contain tables giving very extensive details about all of the data collected during the study from thousands of students in 329 elementary schools. In addition to the detailed data, the reports include the results of various statistical analyses. The report series is made up of the following volumes:

Report Number

1. "The Sample for the Sustaining Effects Study and Projections of its Characteristics to the National Population" by Hoepfner, R., Zagorski, H., and Wellisch, J.

2. "Students' Economic and Educational Status and Selection for Compensatory Education" by Breglio, V. J., Hinckley, R. H., and Beal, R. S.

3. "Student Economic and Educational Status and Receipt of Compensatory Education" by Hinckley, R. H., Beal, R. S., and Breglio, V. J.

4. "Student Home Environment, Educational Achievement, and Compensatory Education" by Hinckley, R. H. (Editor).

5. "The Nature and Recipients of Compensatory Education" by Wang, M., Hoepfner, R., Zagorski, H., Henenway, J. A., Brown, D. S., and Bear, M. B.

6. "Resource Analysis of Compensatory Education" by Haggert, S.A., Klibanoff, L.S., Sumner, G.C., and Williams, R.S.

7. "An Analysis of the Cost and Effectiveness of Compensatory Education" by Sumner, G.C., Klibanoff, L.S., and Haggert, S.A.

8. "Summer Growth and the Effectiveness of Summer School" by Klinanoff, L.S., and Haggart, S.A.

9. "The Measures and Variables in the Sustaining Effects Study" by Hemenway, J.A., Wang, M., Kenoyer, C.E., Hoepfner, R., Bear, M.B., and Smith G.

9a. "A Compilation of the SES Instruments" by the SES Project Staff.

10. "Compensatory Services and Educational Development in the School Year" by Wang, M., Bear, M.B., Conklin, J.E., and Hoepfer, R.

11. "The Effects of Discontinuing Compensatory-Education Services" by Kenoyer, C.E., Cooper, D.M., Saxton, D.E., and Hoepfner, R.

*12. "Does Compensatory Education Narrow the Achievement Gap" by Zagorski, H., Conklin, J.E., Cooper, D.M., Hoepfner, R., and Wang, M.

13. "Substudies on Allocation and Targeting of Funds and Services, Assessment of Student Growth, and Effects of Attrition" by Hoepfner, R. (Editor).

*14. "Achievement Growth as a Result of Grade and Length of Participation in Compensatory Programs" by Rogers, M.S., Landers, K.L., and Hoepfner, R.

15. (No report with this number was prepared.)

*16. "Successful Practices in High-Poverty Schools" by Lee, D.R., Carriere, R.A., McQueen, A.H., Poyner, L.H., and Rogers, M.S.

*17. "Sustained Effects of Previous Compensatory Education on Students in Junior High Grades" by Saxton, D.E., Geddes, C.L., and Hoepfner, R.

*18. "A Description of Compensatory Services in High-Poverty Schools" by Poynor, L.H., Surace, E.M., and Lee, D.R.

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* A draft of these reports was prepared, and in some cases typeset, but sufficient funds were not made available for them to be published.

19. (No report with this number was prepared.)

*20. "Background, Schooling, and Achievement" by Won, E.Y.T., Bear, M.B., and Hoepfner, R.

*21. "A Study of Compensatory and Elementary Education: The Sustaining Effects Study. Final Report" by Carter, L.F.

*A draft of these reports was prepared, and in some cases typeset, but sufficient funds were not made available for them to be published.

CHAPTER III. WHAT IS COMPENSATORY EDUCATION?

Summary

To describe Compensatory Education we contrasted the instructional services received by CE students with those received by regular students in the same schools. It is clear that there are important differences in the services received by these two groups of students. Some of the important differences are:

- *Title I students receive services costing about $436 more than the services regular students receive. Most of this money is spent on teachers, remedial specialists and aides.*
- *Title I students receive considerably more instruction in reading and math than do regular students. But while the Title I students are receiving this additional reading and math instruction the regular students are also receiving instruction of some type. Thus it is not clear that Title I students enjoy a net gain in total instruction.*
- *Title I students receive much of their instruction from teachers who have had somewhat less teaching experience than regular teachers. However, the special teachers have had somewhat more coursework and inservice training in teaching methods than regular teachers.*
- *Title I students receive their instruction in somewhat smaller classes than regular students.*
- *The major difference between Title I instruction and regular instruction is that Title I students receive less of their instruction in large groups in regular classrooms and receive much more instruction in small group settings from special teachers and aides.*
- *The typical mode of special CE instruction is in a pullout setting. The pullout setting seems to offer a positive learning environment and rates very favorably when compared to other instructional settings.*
- *Teachers of Title I students report using different methods and practices in teaching Title I students than do the teachers of regular students. In reading, Title I students are exposed, throughout their elementary grades, to more elementary or basic*

reading methods than are regular students, who receive information in more complex materials. In the first two grades the approaches used in teaching reading are similar for Title I and regular students, but then they begin to diverge. By the sixth grade the approaches most frequently used with Title I students are least frequently used with regular students and vice versa.

- *Teachers of Title I students report a much higher use of audio-visual equipment in their instruction than do teachers of regular students.*

INTRODUCTION

There is no simple explanation or description of CE; it is an amalgam of many different programs, practices, and services. In the Sustaining Effects Study we have two main sources of information about what constitutes CE. First, we have information gained from questionnaires completed by teachers, principals, and district personnel. From this survey material we can determine what services regular and CE students are reported to receive. Second, we conducted an in-depth study of 55 poverty schools. At these schools we visited classrooms and observed the instruction being given to regular and CE students. We talked to the teachers and principals about what their programs included. From these site visits we have detailed descriptive narratives of CE programs. In this Final Report we are including only two short descriptions to give a flavor of the variety of CE programs in different schools.

School A

Three discrete Title I program components serve identified students in this fairly large, 63-year-old urban school. The kindergarten program, which will not be described here, serves 48 students. The primary grades' Title I Reading Program serves 144 students in grades 1-3, while the Computer-Assisted Instruction (CAI) Lab serves 266 students in grades 4-6 in both reading and math.

The three primary grades' Title I reading teachers share a single huge room, where each is scheduled to see six groups of eight students for daily 50-minute sessions. Each has responsibility for teaching students from a single grade, but their teaching procedures are generally the same. Early in the fall, a diagnostic test is administered to each pupil. A needs-assessment sheet profiling the student's strengths and weaknesses is developed based on the results of the diagnostic test. On the basis of the needs-assessment profile, the teacher develops a separate prescriptive educational plan for each child, outlining the sequence of skills to be attacked and materials to be used by the student.

Students leave their homeroom classrooms to attend Title I reading instruction. Upon arrival at the Title I room, students pick up their work folders, which contain assignments for the week, and start to work independently, calling on their teachers when they need help. The teachers also provide some small-group instruction daily, usually to subgroups of three to four students who have common instructional needs. Skill profiles are kept up to date as prescriptions are completed, and the diagnostic test is readministered periodically. The Title I room is well supplied with a wide variety of high-technology equipment and materials that are called into play in the various prescriptions. Heavy use is made of controlled readers, feedback teaching machines, audio tapes, filmstrips, records, instructional kits, and a variety of texts, workbooks, worksheets, and dittos.

The CAI Lab is staffed by one teacher and one aide who oversee students' progress on the 14 teletype terminals in the lab. The terminals are connected to a minicomputer, housed in the school, which serves a number of other schools as well. The provider of the CAI software also provides a curriculum guide, specifying for various levels of performance on the CTBS where students should start in the math and reading curricula. The curricula cover 14 levels of difficulty, depending upon the students' grade levels, entry skills, and progress. The software also provides a "time-out" feature, whereby repeated slow responding is quickly brought to the attention of the teacher. This was perceived to be very valuable for keeping the students consistently on-task.

The teacher and aide monitor student work and provide assistance with either content or machinery as needed by the students. The teacher or the aide reviews the summary printed out on the teletype at the end of each student's daily, approximately 20-minute session. A student who has achieved 100 percent correct on the day's drill in either subject receives a colorful ribbon award to wear back to the regular classroom. This is called "The 100 Percent Club." When the teacher decides that one or more pupils need additional instruction, help is provided in one of several ways. In most cases, the teacher or the aide will work individually with students while they are at the terminals. In some cases, if there are several students having trouble with a particular skill, the lab teacher will take a small group into the adjoining room, which is equipped with a chalkboard and several chairs, and will provide small-group instruction on that skill. On occasion, the CAI Lab teacher will also go into the regular classroom during regular math instruction to give a special lesson to an individual or to a group.

School B

The Title I program serving grades 1-8 in this small rural school consists basically of two full-time aides who provide tutorial and small-group instruction. One aide, who has had one year of college, works primarily with second- and third-grade students in reading and math, and occasionally in spelling and penmanship. Due to overcrowding in the school, she is forced to use about the last 20 feet at the end of a hallway as her classroom. The second aide is a former teacher who has been a Title I teacher's aide at the school for 15 years. She meets with students from grades 1-8, variously for reading, math, spelling, social studies, and penmanship, in a combined office/kitchen/music lounge room.

There is fluctuation during the year in terms of which students see the aides for supplemental instruction. Regular teachers send students in need to the aides, with a priority being given to those judged to be most needy. One of the aides estimated that she had served 43 students for at least six weeks, 11 of whom she had worked with for the entire year. Students who are seen on a regular and long-term basis tend to be those who generally have difficulty understanding new concepts as they are introduced in the regular classroom, and thus are behind the other children. Other students are sent on an as-needed basis, when their regular classroom teacher sees that they are having difficulty with a particular new concept or skill. In such cases, they may go to the aide for a few days or a few weeks. Still other children are sent to the aides long enough to catch up on work they have missed during absences from school. For students who attend regularly, the scheduled number of sessions weekly and the duration of those sessions varies from pupil to pupil or from small group to small group. Some students see an aide daily, while others go only once a week, in sessions ranging from 15 to 45 minutes. The aides work with a maximum of five students in a group, and usually with only one or two students at a time.

The regular classroom teachers generally tell the aides fairly specifically what skills need work by their students, with the aides having more or less latitude in selecting the materials and approach to be used depending upon their relationships with the particular teachers involved. During the 1978-79 school year, no Title I-funded equipment or materials were received at this school, but audiovisual equipment and instructional kits received in previous years are available for use by any teachers in the school. In part because of their distance from the equipment locations, the aides tend not to use any of the equipment, and generally base their work on whatever texts, workbooks, or worksheets are being used in the regular classroom.

The two Title I programs described here are in marked contrast, but even more extreme pictures could have been chosen to highlight the differences in intensity and content of the instruction received by students, all of whom are labeled Title I students.

Report 18 contains a number of additional descriptions of CE programs. They were selected to illustrate the settings in which instruction takes place, the kins of lesson material used, and the methods used to manage classroom instruction. Survey techniques tend to lump together students receiving quite different services, but in terms of the national program, survey data can give a good summary of the Title I CE program. The material that follows is an amalgam of the information collected by questionnaires completed by the district staff, school principals, and teachers, and reported in detail in Report 5. The more qualitative material collected by visiting classrooms and interviewing principals and teachers in high poverty schools is given in Report 18.

COMPENSATORY EDUCATION FUNDS--HOW MUCH MONEY IS THERE AND ON WHAT IS IT SPENT?

There are many different sources of CE funds; there is money from local, state and federal sources. The amount of these funds varies widely from district to district and, within a given district, schools vary considerably in the amount and kind of funds they have available. Title I is the largest single source of CE funding, and we will examine Title I in detail throughout this chapter.

We asked the business managers of the school districts to describe the amount of Title I funds that was spent for various kinds of services during the 1976-77 school year. Table III-1 shows the different services on which Title I funds are spent for reading, math, and common services not associated with either subject. It will be seen that the largest amounts are spent on teachers, curriculum specialists, teaching assistants and aides. Smaller, but in the aggregate, significant amounts are spent on planning and evaluation,

Table III-1

Per-Pupil Expenditures of Title I Funds*

	Reading	Math	Common Costs
Teachers	$237	$223	
Remedial and Curriculum Specialist, Teaching Assistants and Aides	181	109	
Training of Instructional and Non-Instructional Staff	11	16	
Administrative Services, Planning, Evaluation	30	37	
Instructional Supplies (texts, AV aids, supplies)	26	21	
New Equipment, Building Alterations, etc.	47	42	
Staff and Materials for School PAC, PTA, etc.			$22
Other Costs**			94

*Columns cannot be added since different schools have different mixes of services.

**Other costs include guidance, counseling, health and nutritional services.

Source: Report 9, Table 8-31

supplies, and equipment. Important amounts are spent on parent advisory groups, parent-teacher associations, and the like. Also, funds go to guidance, counseling, health and nutritional services. While these figures cannot be added to find the expenditures per pupil, since different schools have different mixes of services, they represent significant supplementation to the regular school expenditures. For the schools in the SES sample, the average annual per-pupil regular expenditure in 1976-77 was $1,189, and the average additional Title I per-pupil expenditure was about $436 for Title I students. The exact amounts for per-pupil expenditures are difficult to obtain because of different ways of counting the number of students receiving various services. However, these figures do give an indication of the relative degree to which Title I students receive services over and beyond those given to regular students. The $436 Title I dollars pay for the various services that will be described throughout this chapter. There can be no doubt that Title I students receive instructional services different from those received by regular students.

How are these special funds used? In the 55 high poverty schools we observed 1,257 instructional groups. Of these groups, 45 percent were regular instructional groups and thus received no special services, 30 percent received services paid for by Title I funds and other-CE funds. The remaining 15 percent were paid by other CE funds or funds from special sources. Thus, we see that in high-poverty schools over half of all instructional groups have services paid for by other than regular school district funds, with Title I funds contributing the largest source of outside funding.

WHO TEACHES TITLE I AND REGULAR STUDENTS

Table III-2 shows a number of characteristics associated with teachers in various classroom settings. In our total sample of schools about a tenth of the teachers were in non-CE schools. Among the reading teachers in CE schools 17 percent teach only CE students, 60 percent teach both CE and non-CE students, and 23 percent teach non-CE students. The corresponding figures for math teachers are 11 percent, 43 percent, and 46 percent. Thus, we see that in reading in CE schools most teachers teach both CE and non-CE students, while roughly a fifth teach only CE students and another fifth teach only regular students. In math the situation is somewhat different. There are somewhat fewer math teachers in CE schools who teach only CE students, but there is a considerably higher percentage of math teachers who teach only non-CE students.

Table III-2

Average Experience and Training of Teachers

	Teaching Only CE Students	Teaching Both CE and Non-CE Students	Teaching Only Non-CE Students in CE School	Teaching Only Non-CE Students in Non-CE School
Reading				
Percentage of Teachers Who Were:	15	54	21	11
Percentage of Teachers in CE Schools Who Were:	17	60	23	--
Number of Years Teaching in Any School	10.3	11.2	11.0	11.9
Number of Years Teaching in Current School	6.1	6.8	6.6	6.6
Highest Earned College Degree*	2.6	2.4	2.5	2.5
Number of College Courses in Teaching Reading	1.9	1.3	1.1	1.2
Number of Hours of Inservice Reading Training	14.3	12.0	10.2	10.9
Math				
Percentage of Teachers Who Were:	10	38	40	12
Percentage of Teachers in CE Schools Who Were:	11	43	46	—
Number of Years Teaching in Any School	9.3	10.8	11.5	11.9
Number of Years Teaching in Current School	5.8	6.6	7.1	6.7
Highest Earned College Degree	2.5	2.4	2.5	2.5
Number of College Courses in Teaching Math	.9	.7	.5	.6
Number of Hours of Inservice Math Training	8.2	9.0	5.5	6.9

*1 = less than 4 years of college, 2 = bachelor's degree, 3 = 5-year preparation, master's degree, or 6 years specialist degree, 4 = doctor's degree.

Source: Special tabulation done for final report.

For both reading and math, those teachers who teach only CE students have had less total teaching experience and less teaching experience at their current schools. However, those who teach only CE students have slightly more college education, have more college courses in teaching, and somewhat more inservice training than other teachers. Presumably such training should make these teachers more effective. On the other hand, the regular teachers have had more teaching experience, which should make them more effective. In Report 10 the one teacher characteristic that seems to have been associated with greater student achievement was the amount of teaching experience of the teacher. Thus, to the extent that Title I students are receiving their instruction from less experienced teachers--and our evidence suggests this is the case--they may be at some disadvantage relative to regular students.

COMPENSATORY EDUCATION INSTRUCTIONAL SERVICES

What are CE instructional services? In the elementary grades they are largely reading and math instruction. Thus, much of this chapter will be devoted to comparing the amount and kind of instruction received by regular and CE students in reading and math. The school setting in which CE instruction is given varies significantly from school to school. Our approach to defining CE is to determine what services CE students receive in contrast to those received by regular students. Thus, throughout this chapter we will be comparing the amount of instruction CE students received with that received by regular students; we will compare the kinds of teachers instructing CE students with those instructing regular students; and we will contrast the instructional approach and techniques applied to CE students with those applied to regular students.

The number of hours in the school day is almost always fixed, with CE students and regular students in a school attending a similar number of hours, but the amount of instruction CE students receive in reading and math is different from the amount of instruction received by regular students. Figure III-1

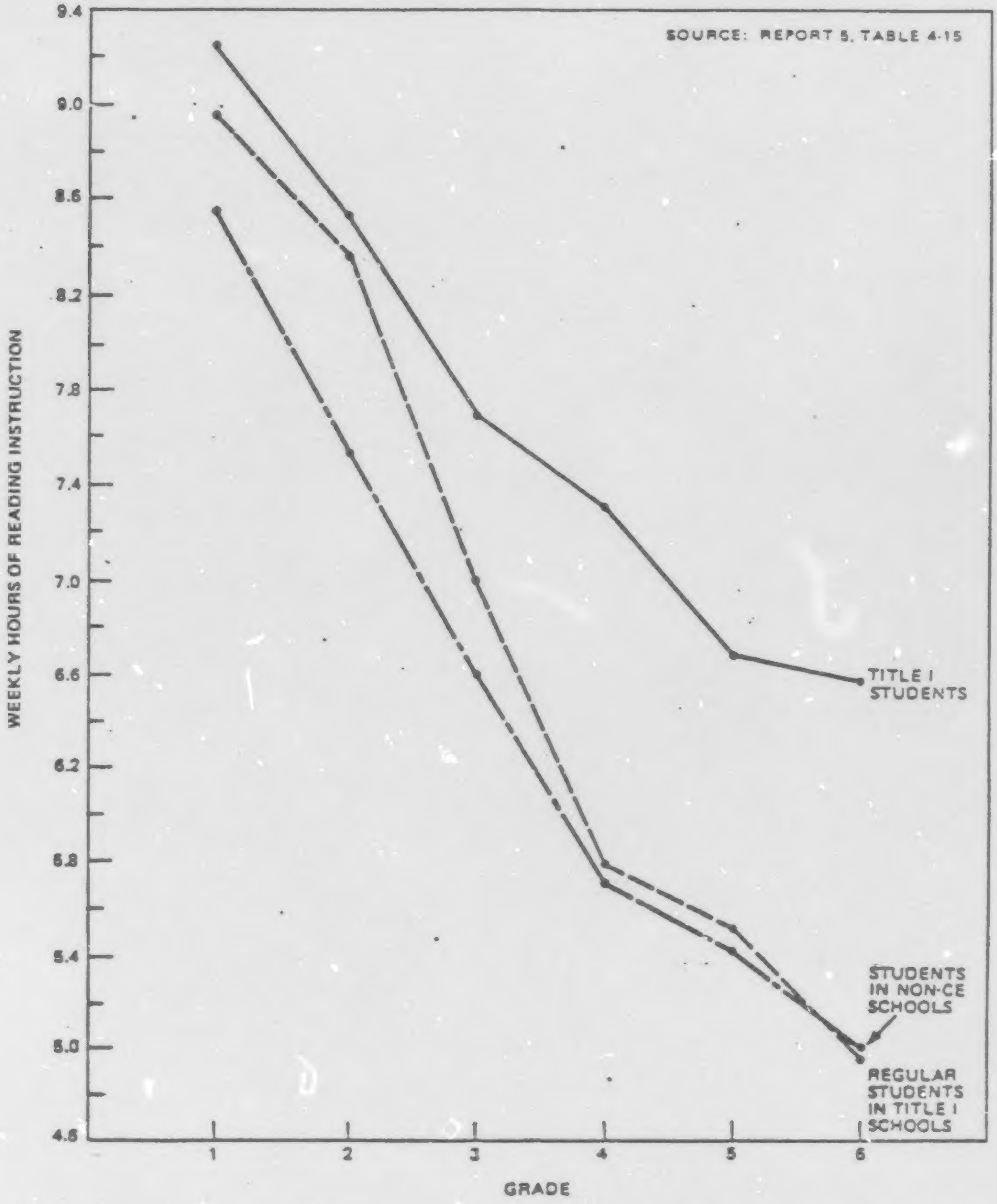


Figure III-1

Hours Per Week Devoted to Reading Instruction for Title I and Regular Students in Title I Schools and Non-CE Schools shows the number of hours of reading instruction received by three groups of students: Title I students, regular students in the same schools, and students in schools that do not have any CE students. The figure shows that in the first and second grades Title I students and regular students in Title I schools receive essentially the same amount of reading instruction. However, students in schools not having CE programs (schools probably being in more affluent attendance areas and having somewhat higher-achieving students), even in the first and second grades are receiving, and presumably need, fewer hours of reading instruction. Starting in the third grade and continuing through the sixth grade, Title I students receive much more reading instruction than regular students in either Title I or non-CE schools.

Since Title I students spend more of their time on reading instruction than regular students, are the CE students missing out on other instruction? Figure III-2 shows the amount of reading-related activities received by Title I and regular students. 'Reading-related activities' are in addition to regular reading and include spelling, vocabulary study, grammar, and writing. It seems that the Title I students spend a little less time in reading-related activities than regular students, but the difference is only about a tenth of an hour a week while the difference in reading instruction is as much as 1.8 hours per week.

We asked reading teachers, "When students are participating in compensatory reading activities, in what types of activities are their non-participant peers involved?" Teachers were asked to check all items that applied. The response from grade to grade tended to be quite similar. A majority checked other reading activities, 30 percent checked math activities, about 45 percent checked activities related to other subject matter areas, about 30 percent checked "study time," and about 25 percent checked "student-selected activities." About 15 percent checked "visits to the library," about 5 percent indicated physical education activities, and about 2 percent checked "field trips."

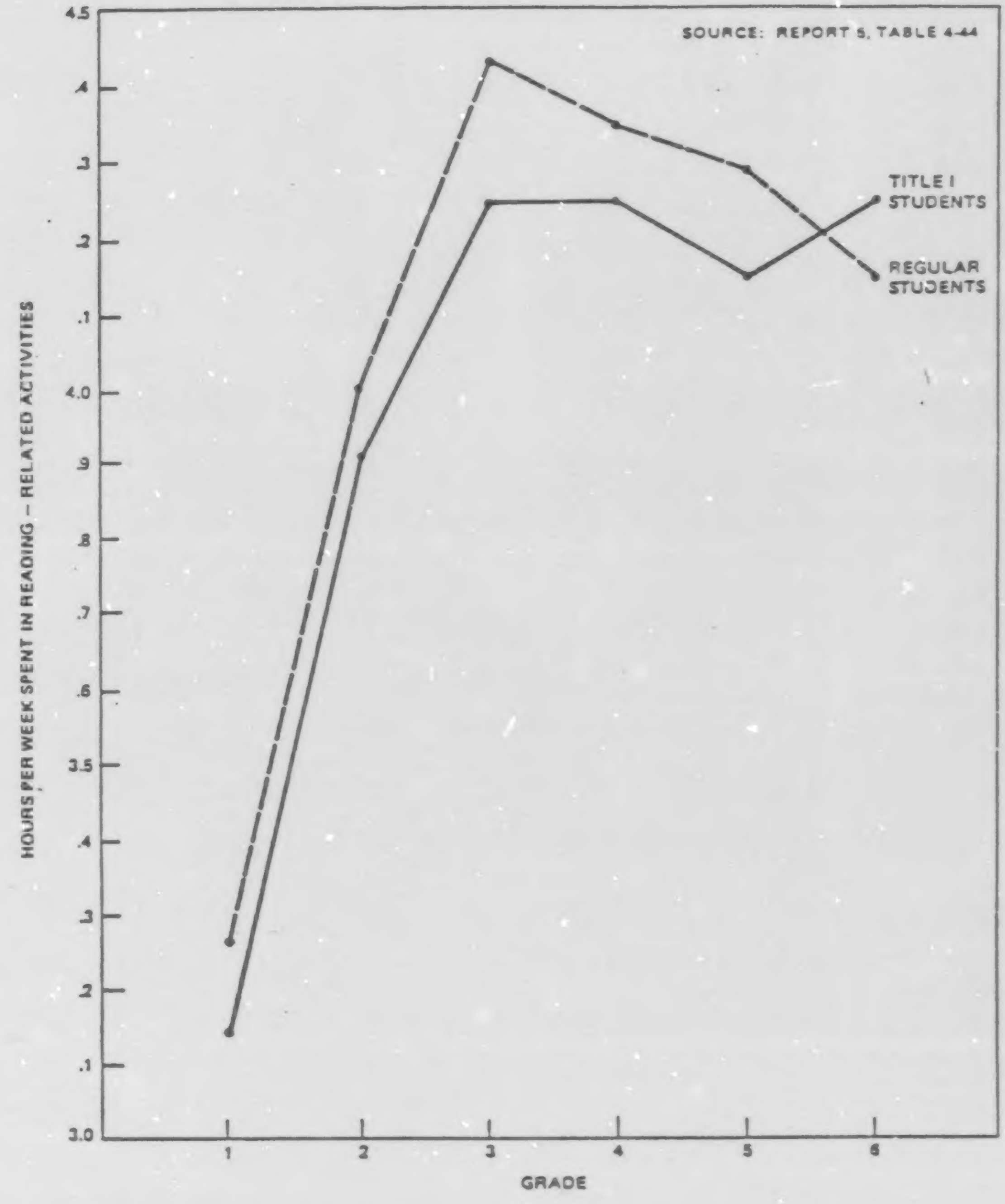


Figure III-2

Hours Per Week Spent on Reading-Related Activities by Title I Students and Regular Students in Title I Schools

These results are confirmed by similar responses given by teachers in the high-poverty schools. The teachers were asked, "When any of your students receive compensatory reading/math instruction, what subjects are your non-compensatory students _usually_ studying?" Table III-3 shows the results. Again, it will be seen that while the CE students are receiving reading instruction their regular classmates are usually receiving reading or reading-related instruction. As will be seen later the CE students are receving reading instruction of a different character and in smaller groups with more individual attention.

Table III-3

Subjects Missed by Compensatory Students While They Receive Compensatory Reading Instruction

Subject(s) Usually Being Studied by Non-Compensatory Students	Percent of 193 Teachers Responding
Regular reading or mixed reading and language arts block	48
Several subjects, including regular reading and/or regular math	15
Language arts	10
Several subjects, other than regular reading or math	7
Regular math	5
Social studies	5
Study period	4
Subjects missed varied and were not specified	4
Other (includes science, PE, penmanship, Spanish)	3

Source: Report 18, Table 2-5.

Thus, while the CE students get more reading instruction, they are missing other instruction. Given the fixed length of the school day, this is almost inevitable and it means that regular students get more instruction in other subject areas than CE students. Reading is basic, and CE students need instruction in reading, but they pay a price for it in terms of other instruction missed.

Figure III-3 shows that Title I students receive much more instruction in math than do regular students. On the average, regular students receive about 4.8 hours per week of math instruction while Title I students receive about 5.8 hours per week; the difference in favor of the Title I students starts in the first grade and continues through the sixth grade. In reading we saw a sharp decrease in hours of instruction as grade increased, but in math this is not the case; in math there is a very slight tendency for hours of instruction to increase from the first to the fifth grade and then to drop in the sixth grade. Math teachers were also asked to indicate what the regular students did during the time when Title I students were receiving additional math instruction. The results are very similar to those reported for reading. The regular students are involved in other math activities, reading activities, activities in other subjects, general study time, and student-selected activities while the CE students are studying additional math. Similar results were obtained when teachers in the high-poverty schools were asked this same question.

In summarizing the results for hours of instructional service, it is clear that CE students receive very significantly more hours of reading and math instruction than do regular students. But while the CE students receive this additional instruction regular students are often receiving instruction in these and other subjects. Thus, CE students have a gross gain in reading and math instruction, but it is questionable whether they have a net instructional gain when the whole curriculum is considered.

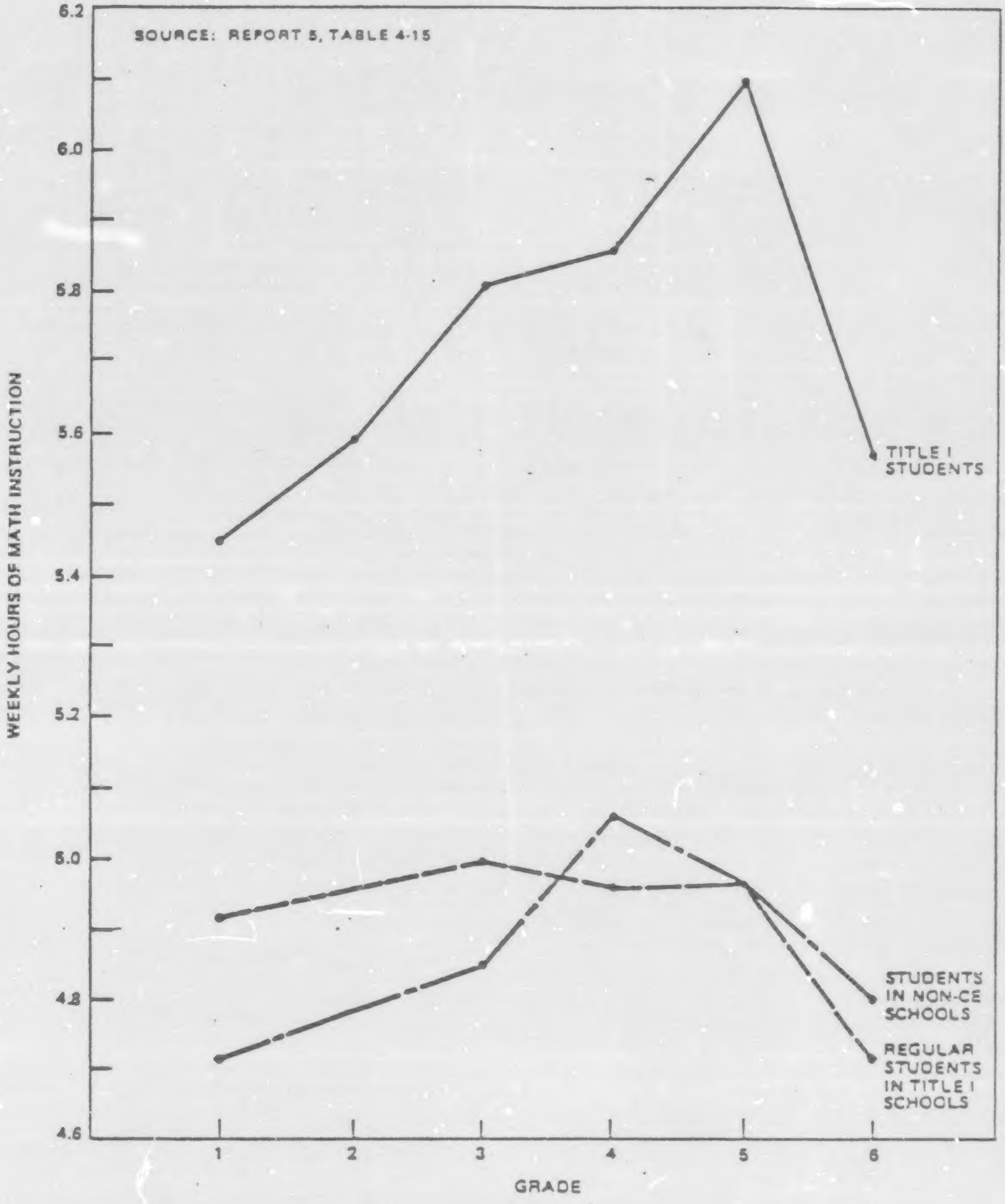


Figure III-3

Hours Per Week Devoted to Math Instruction for Title I Students and Regular Students in Title I School and Non-CE Schools

CLASS SIZE

CE students receive more hours of instruction in reading and math than do regular students, but is it of the same or a different quality? One frequently suggested measure of quality is the size of the class in which instruction is given. Figure III-4 shows the average class size by grade for Title I students and for regular students in Title I schools. It will be seen that for both reading and math the size of the class increases as grade increases. It is also apparent that classes composed of Title I students are smaller. The differences are not large, but even a difference of one or two students should result in somewhat more individual attention for the CE students. At the elementary level much of the instruction in basic subjects is not given to the whole class but rather to smaller groups of students. Figure III-5 shows the way in which reading instruction is given in terms of the use of subgroups of the full class. In the first four grades almost all of the reading instruction takes place in a subgroup setting and even in the fifth and sixth grade subgroup instruction is the predominant mode of instruction. The use of subgroups characterizes instruction for both Title I students and regular students. There is some tendency for the use of subgroups to decrease as grade increases, and there is a tendency for regular students to be more frequently in groups composed of students at similar levels of achievement than is the case with Title I students.

A figure similar to Figure III-5 for reading could be presented for math, but the six lines cross so much that the figure would be more confusing than illuminating. The interested reader can refer to Table 4-17 in Report 5 for detailed figures. The general results are that grouping is used considerably less frequently for math than it is for reading. For Title I students math instruction is given in groups about 70 percent of the time while for regular students the figure is about 60 percent.

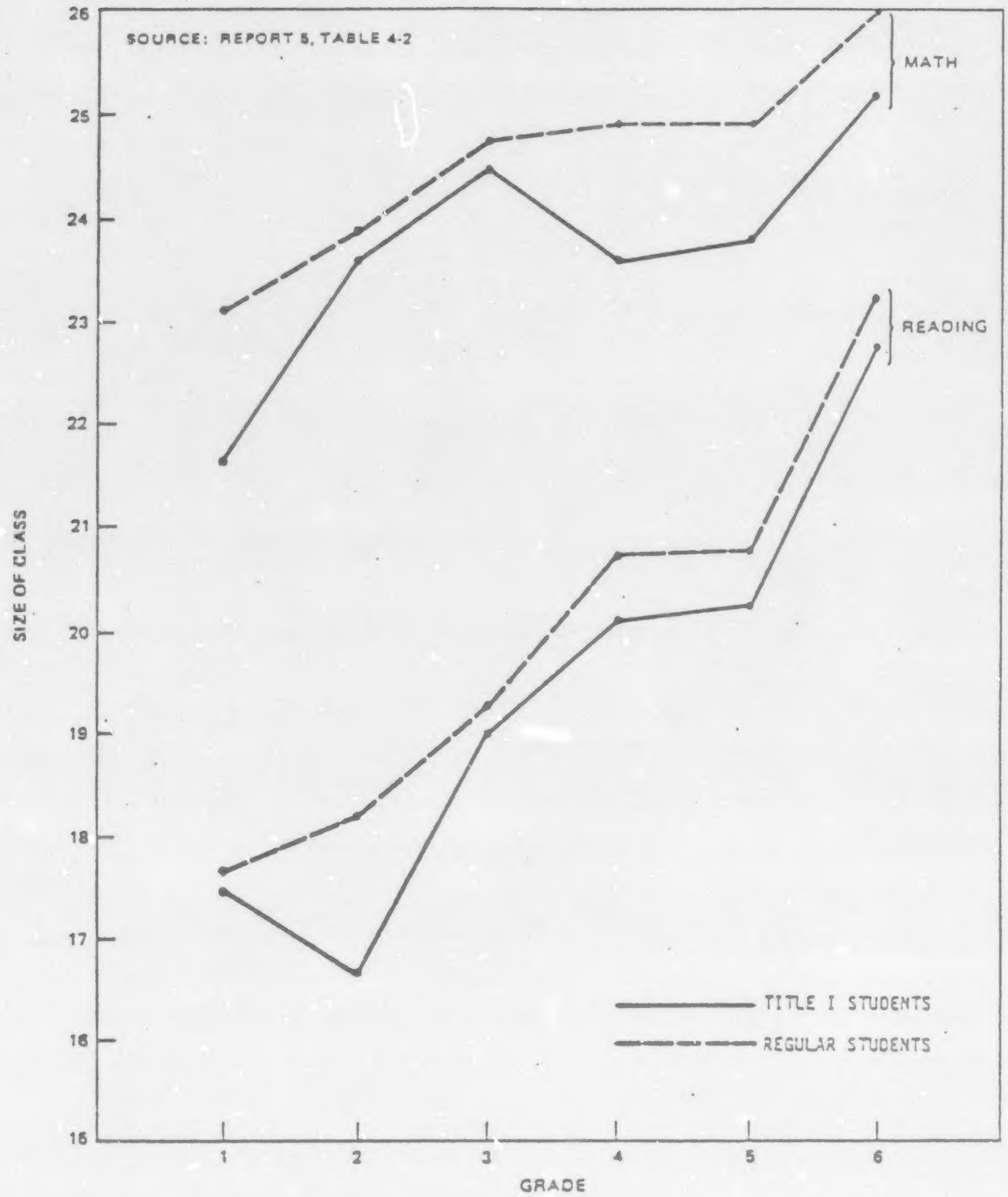


Figure III-4

Size of Reading and Math Classes for Title I and Regular Students in Title I Schools

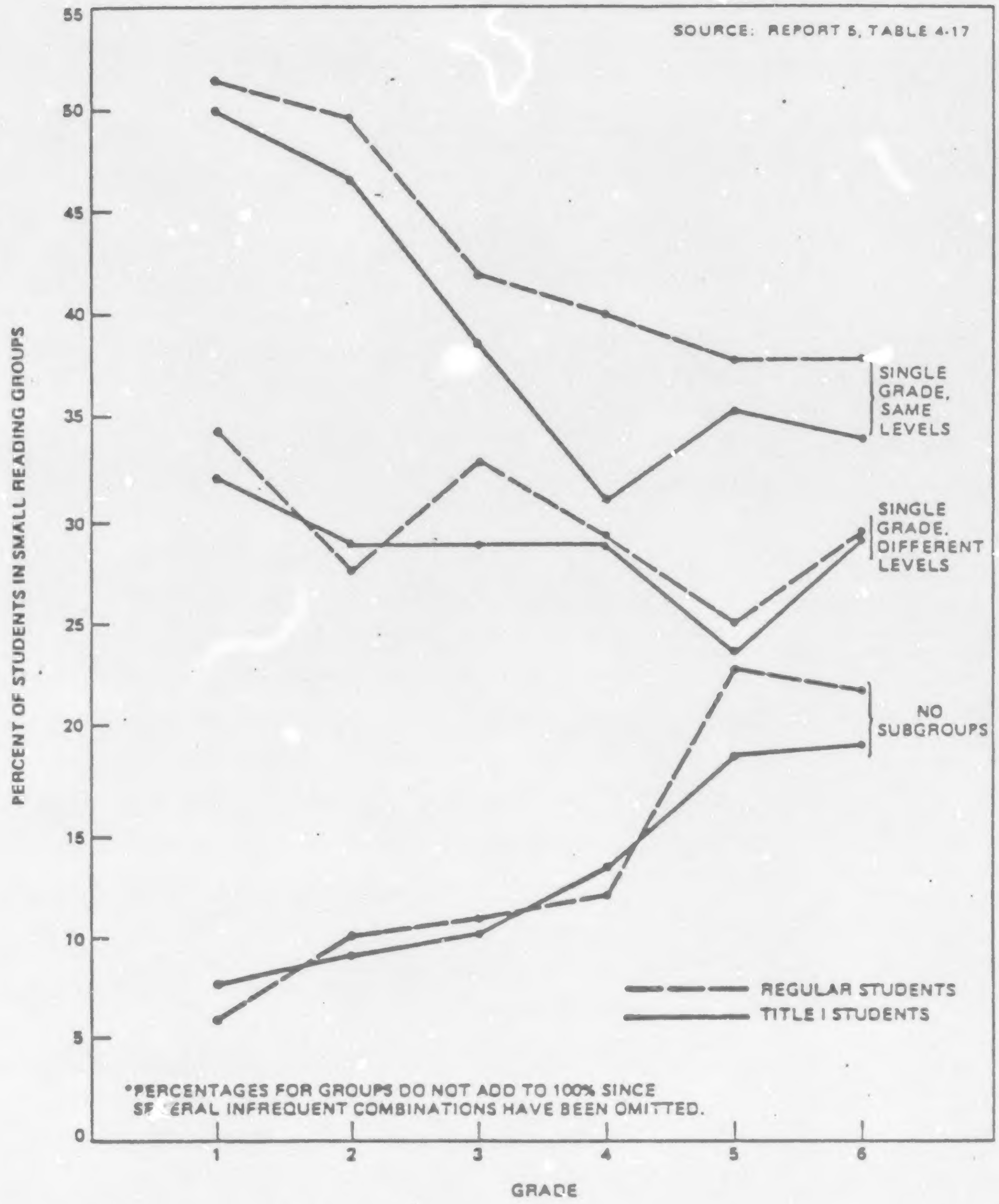


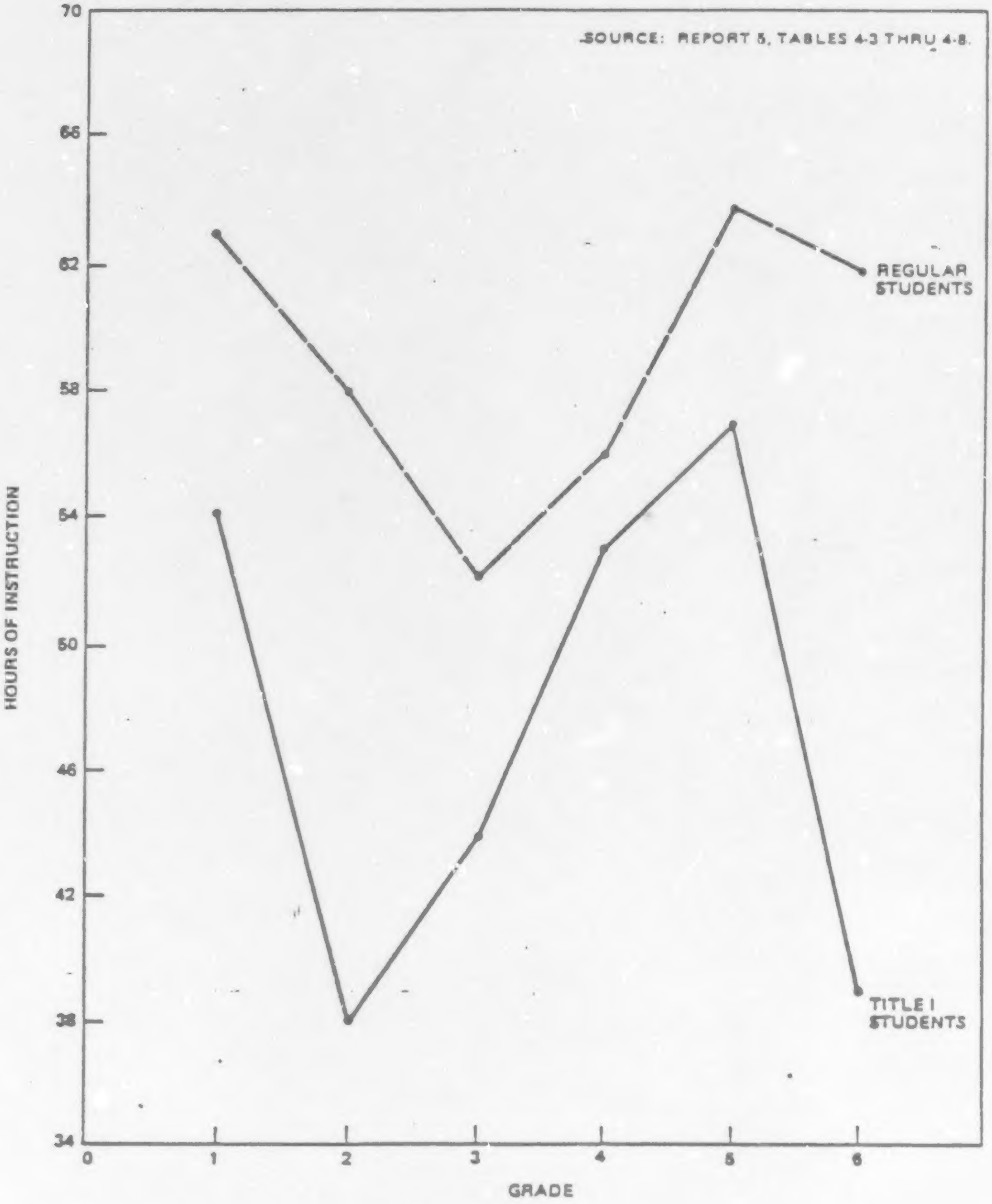
Figure III-5

Percentage of Students in Various Types of Subgroups for Reading Instruction for Title I and Regular Students in Title I Schools*

In summary it can be said that Title I students receive their instruction in somewhat smaller classes than regular students. Much of the instruction in reading is given in subgroups rather than to the whole class. For math the situation is somewhat different with more of the instruction being whole-class instruction.

IN WHAT INSTRUCTIONAL SETTINGS DO TITLE I AND REGULAR STUDENTS RECEIVE INSTRUCTION?

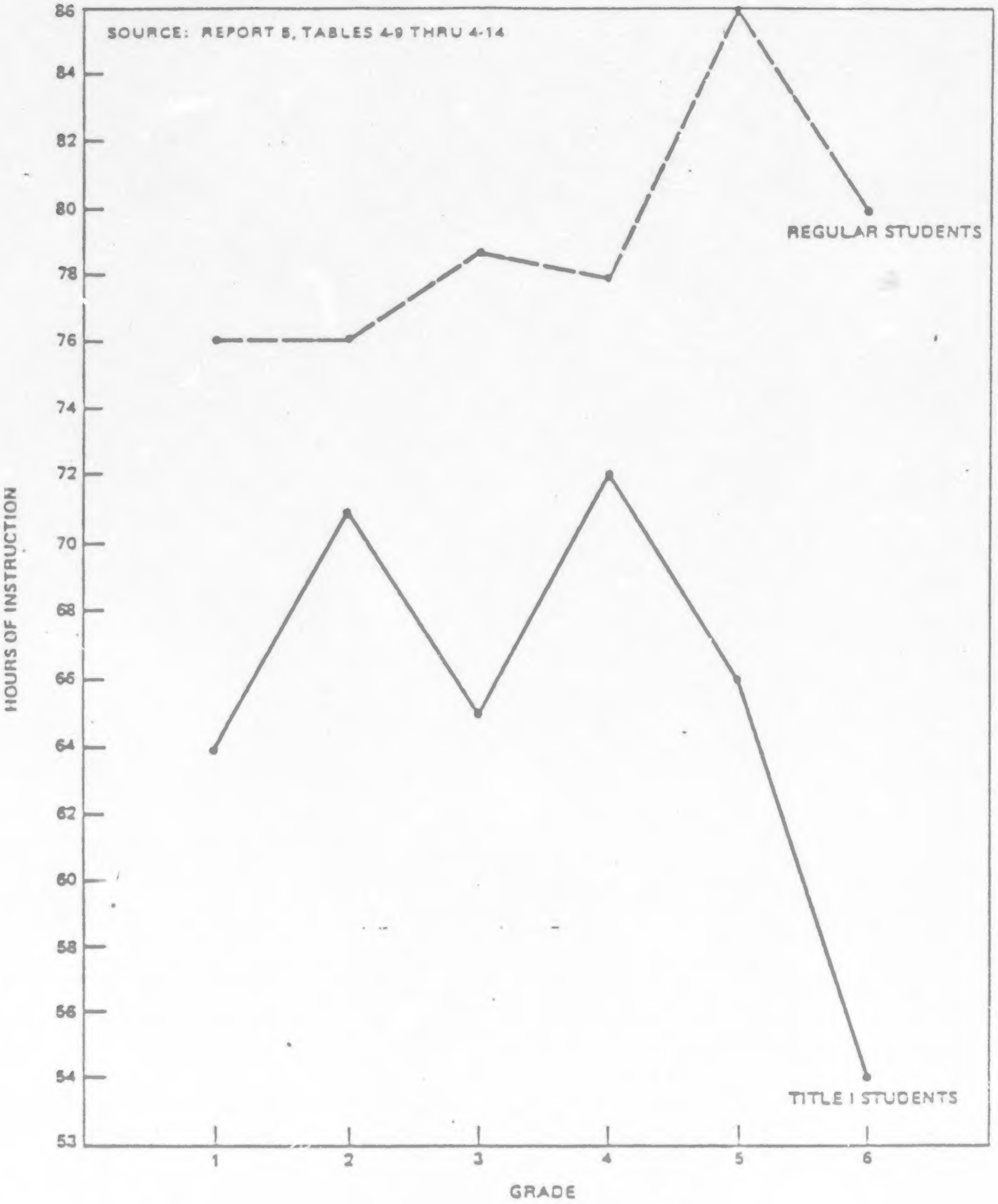
As already indicated instruction can be given in many different settings. It can be given to the whole class in the regular classroom by the regular teacher, or it can be given in small groups by a special teacher, or in a special room by a special teacher, and any number of other combinations. Four times a year teachers completed a Student Participation and Attendance Record which, for each student, gave us a report on the setting in which the student received instruction. From this record we can compare the setting for Title I and regular students in Title I schools. Figure III-6 shows by grade, the hours of instruction for Title I and regular students in the regular whole-classroom setting by the regular teacher. It will be seen that Title I students receive considerably less instruction in reading in this setting. Figure III-7 shows the same thing for math instruction with the same results. Figures III-8 and III-9 show the amount of instruction in reading and math with the regular teacher when the class is broken down into smaller groups. For reading, both Title I and regular students receive about equal amounts of instruction in this setting, but for math, the Title I students receive considerably more instruction from the regular teacher in small groups than do the regular students. Figures III-10 and III-11 show the amount of reading and math instruction given by special teachers and aides (usually in a small group setting) for Title I and regular students. It will be noted that the Title I students receive much more instruction in these settings than do regular students. Finally, Figures III-12 and III-13 show the amount of instruction where the student is working alone without the immediate assistance



SOURCE: REPORT 5, TABLES 4-3 THRU 4-8.

Figure III-6

Annual Hours of Reading Instruction Received by Title I and Regular Students From Regular Classroom Teachers in Student Groups of 14 or More in Title I Schools



SOURCE: REPORT 5, TABLES 4-9 THRU 4-14

Figure III-7

Annual Hours of Math Instruction Received by Title I
and Regular Students From Regular Classroom Teachers
in Student Groups of 14 or More in Title I Schools

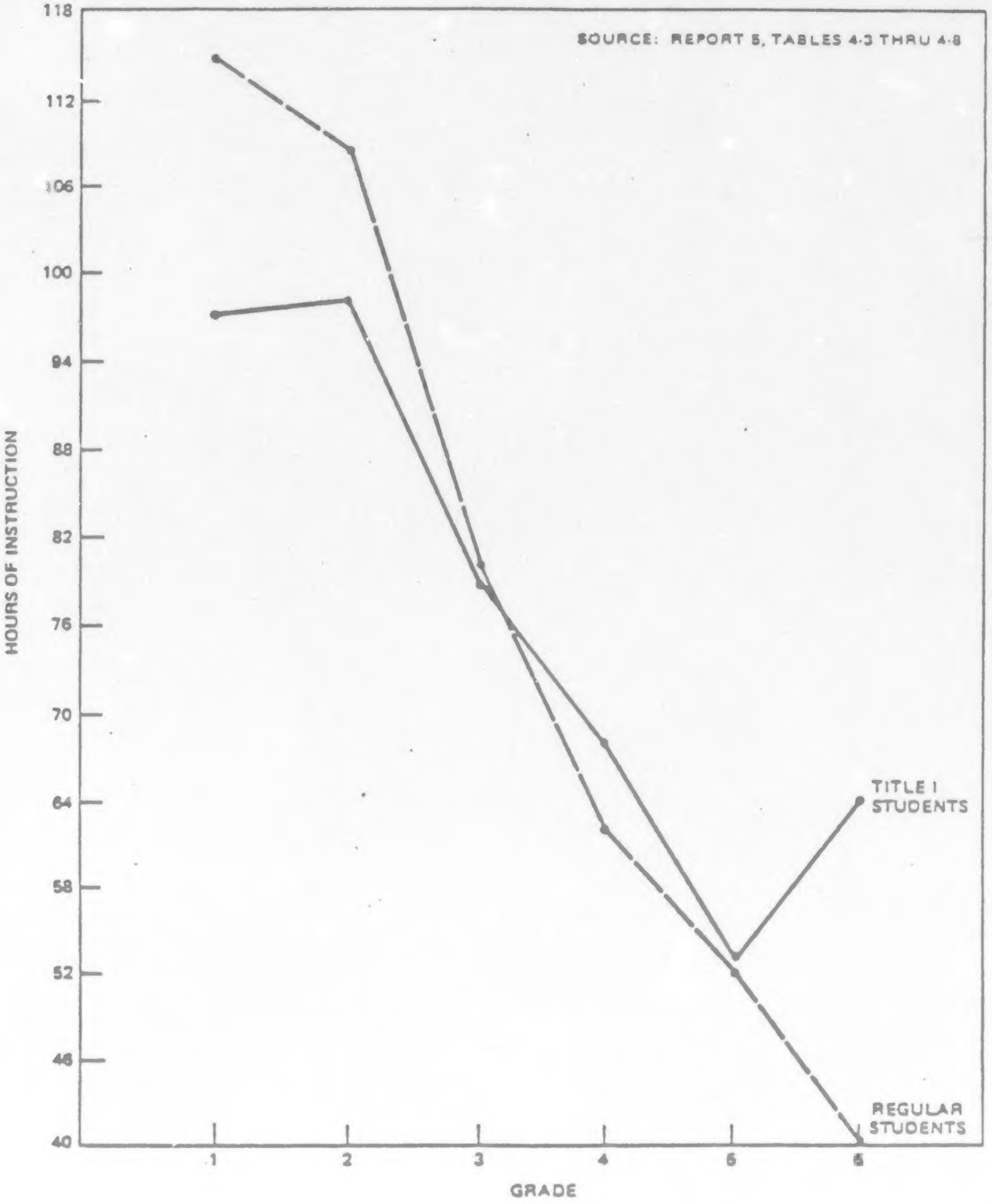
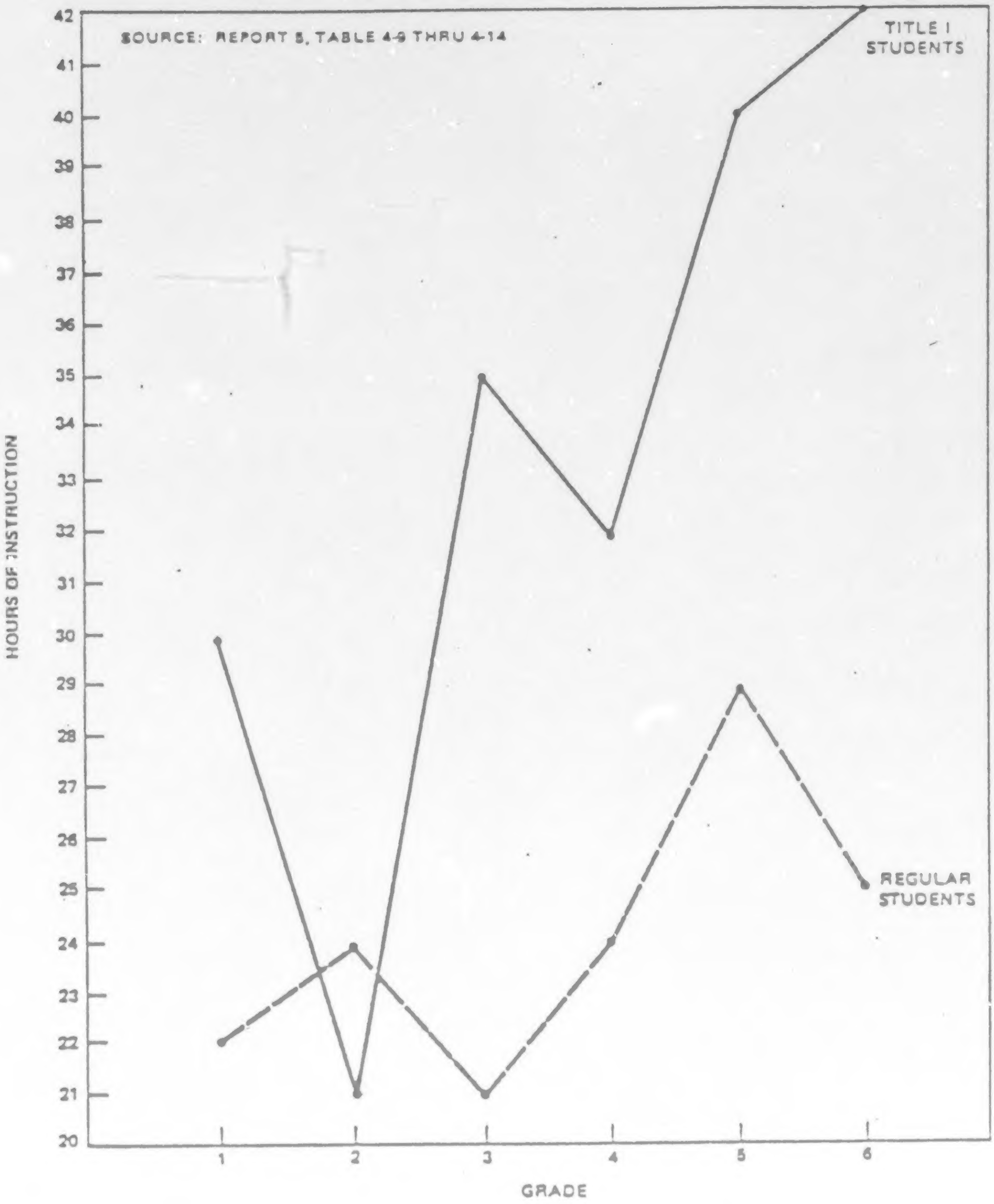


Figure III-8

Annual Hours of Reading Instruction Received by Title I and Regular Students From Regular Classroom Teachers in Student Groups of 1-13 in Title I Schools



SOURCE: REPORT 5, TABLE 4-9 THRU 4-14

Figure III-9

Annual Hours of Math Instruction Received by Title I and Regular Students From Regular Classroom Teachers in Students Groups of 1-13 in Title I Schools

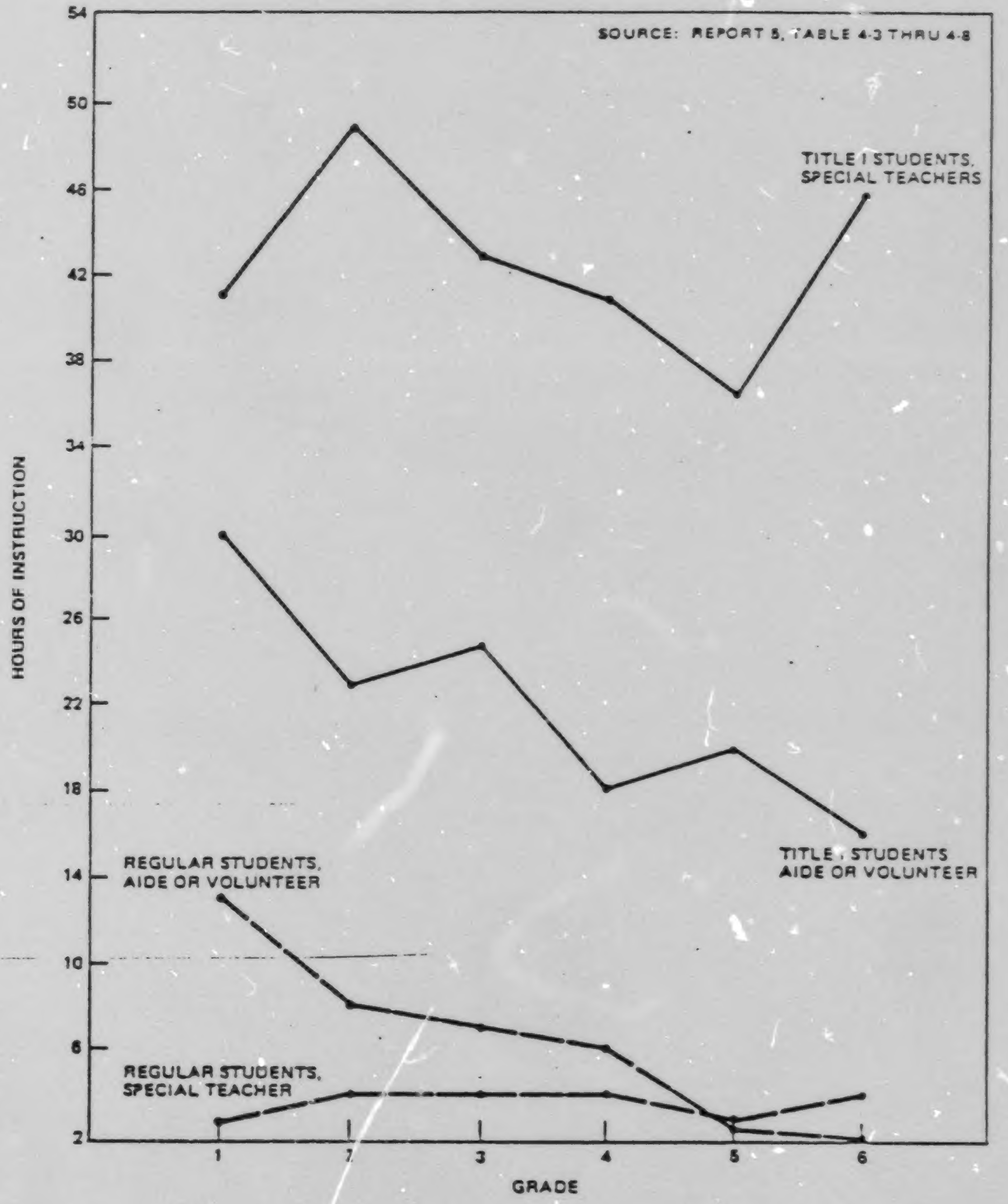


Figure III-10

Annual Hours of Reading Instruction Received by Title I and Regular Students From Special Teachers and From Aides or Volunteers in Title I schools

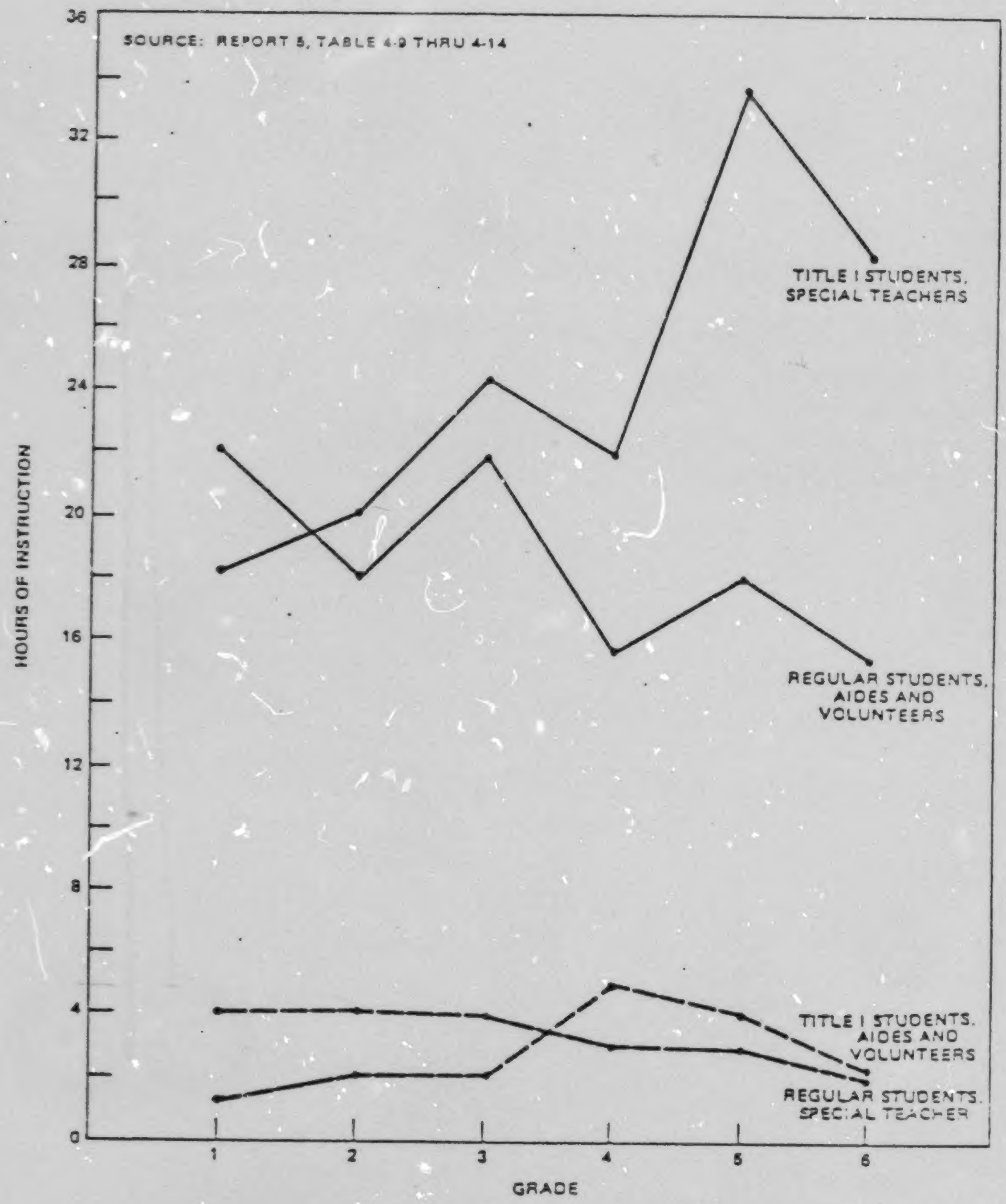


Figure III-11

Annual Hours of Math Instruction Received by Title I and Regular Students From Special Teachers and From Aides or Volunteers in Title I Schools

98

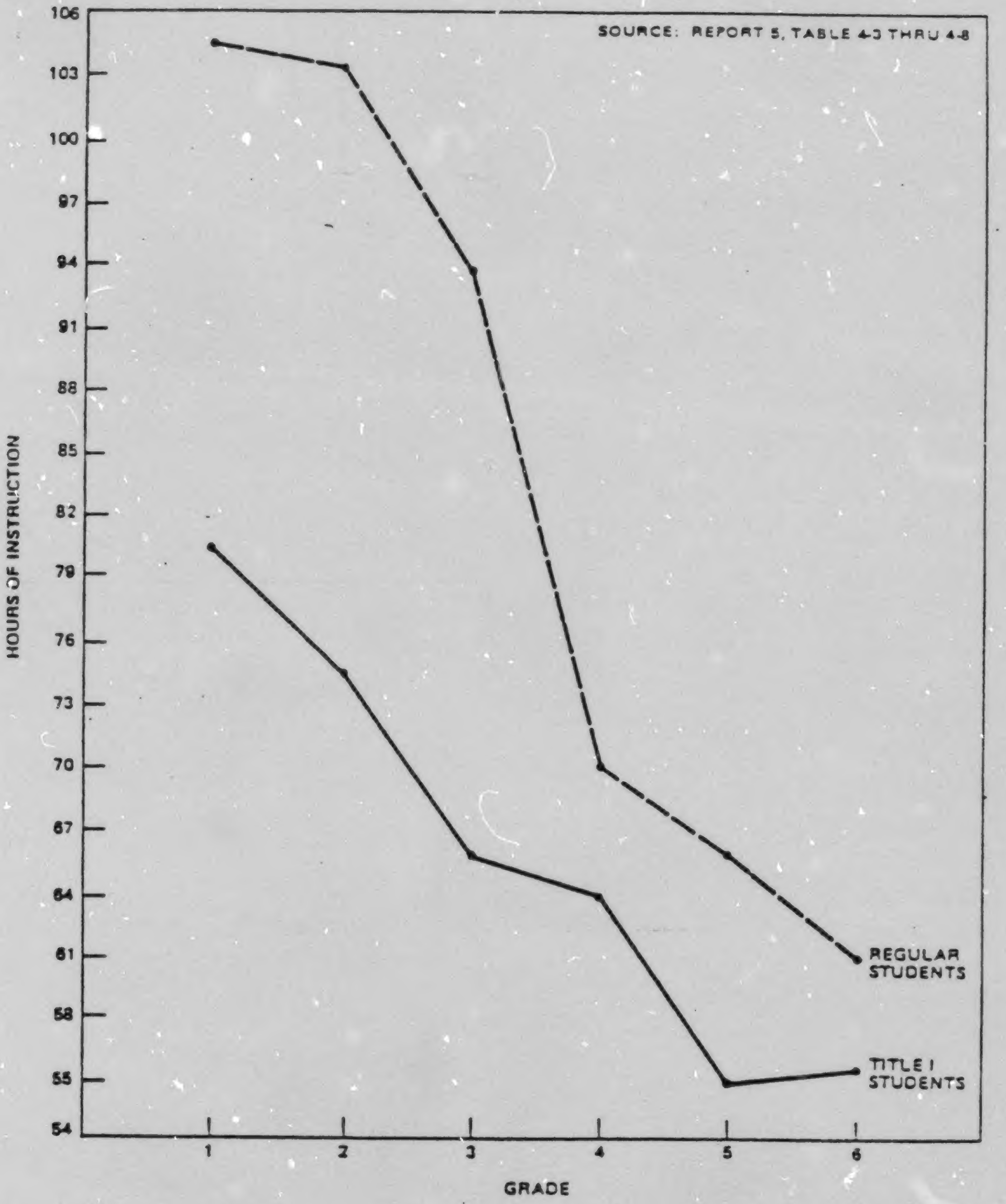


Figure III-12

Annual Hours of Reading Instruction Received by Title I and Regular Students by Individual Seat Work in Title I Schools

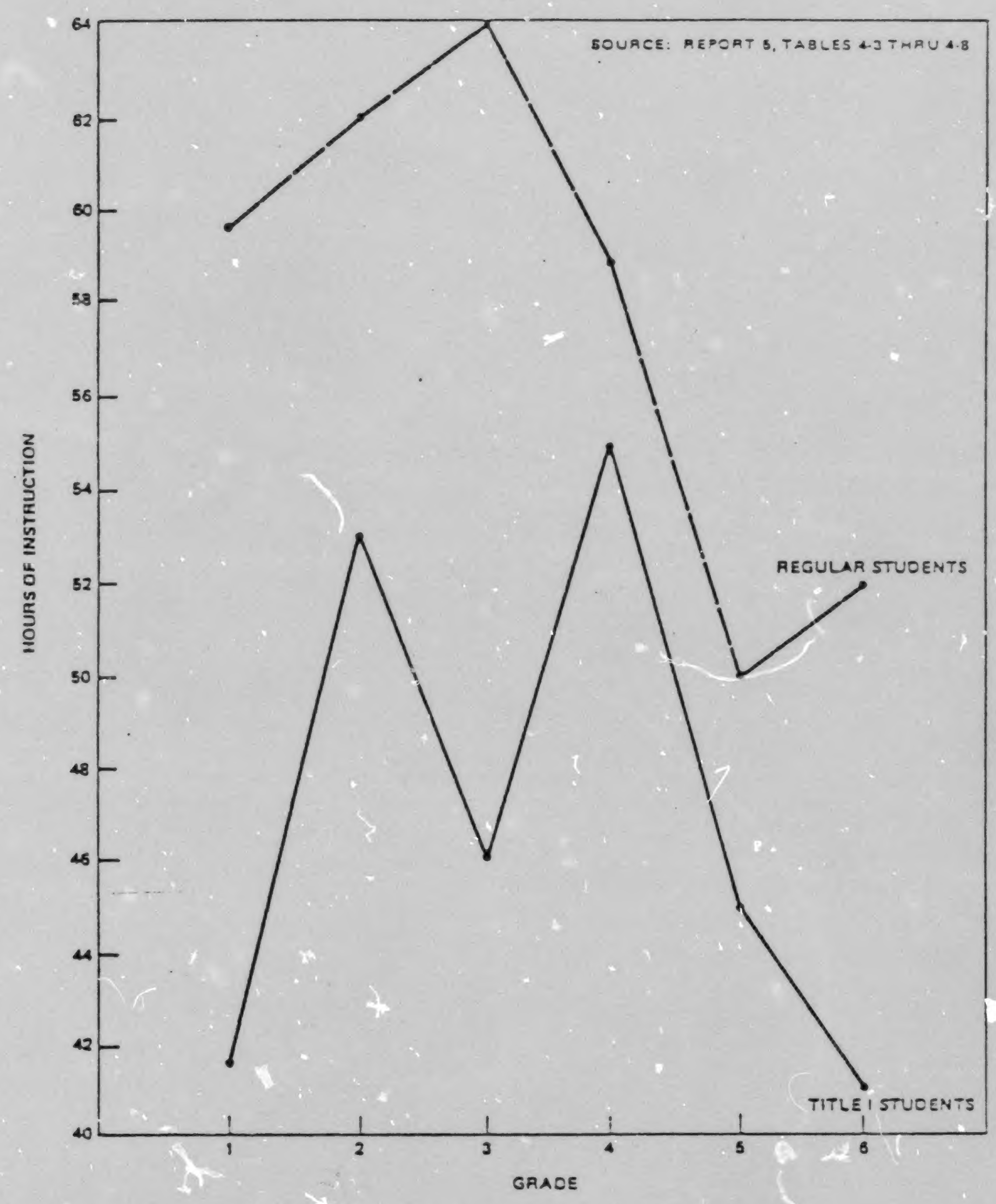


Figure III-13

Annual Hours of Math Instruction Received by Title I and Regular Students by Individual Seat Work in Title I Schools of a teacher or aide. It will be noted that regular students engage in considerably more of this kind of learning than do Title I students. This should be to the advantage of the Title I students since they should learn more when being actively taught rather than when working by themselves.

We have included so many graphs on this subject because we think it presents one of the most important distinctions between Title I and regular instruction. It should be remembered that all of these students come from the same Title I schools. The graphs show clearly that in both reading and math Title I students receive less instruction from the regular teachers in whole-classroom settings and that Title I students spend much less time working on their own with workbooks, dittoed sheets, etc. But the most significant difference is that, in contrast to regular students, Title I students receive much more instruction from special teachers and aides in small group settings. The Title I dollars largely go to buy this difference in instructional personnel and setting, a setting that should be favorable to learning. (In Chapter V we will see whether this is indeed the case.)

The difference is further illuminated by our study of high-poverty schools. In the high-poverty schools observers visited instructional groups and counted the number of students present and the number of staff members giving instruction. Table III-4 shows the number of students present in four different instructional settings: the regular classroom, pullout instruction, instruction where additional staff assist the regular teacher, and self-contained classrooms (where students are given a special curriculum, such as in Follow Through classrooms).

The figures of major interest are those for regular instructional groups and those for pullout instructional groups, since most compensatory education takes place in pullout groups. It will be seen that the pullout groups are two and a half times smaller than regular instructional groups and that each student has almost three times as much staff time available as in a regular instruc-

Table III-4

Instructional Group Size and Staff Time for Each Student In Four Settings

	Average Instructional Group Size	Staff Minutes Per Hour for Each Student
Regular Instruction	18	5
Pullout Instruction	7	14
In-Class Instruction	20	6
Self Contained Classroom	16	6

Source: Report 18, Table 4-1

tional group. In the other two settings the number of students and amount of staff time are similar to those in the regular classroom. Here we see that CE students receive much more intensive instruction than other students.

In pullout settings, 40 percent of the groups were taught by a CE or specialist teacher with special instructional materials or equipment and in another 36 percent there was also a paraprofessional. In 11 percent of the groups there was only a paraprofessional. When the CE instruction was in the regular classroom the resource, in addition to the regular teacher, was a paraprofessional 60 percent of the time and in another 20 percent a paraprofessional plus special materials or equipment.

In addition to simple class size, the quality of instruction can be judged by the proportion of students who are actually involved in the instruction. During each observation period the observers noted the number of students who appeared to be 'off-task', that is who were not apparently engaged in learning activities. In addition they noted the apparent cause of the 'off-task' behavior. Table IV-5 shows the amount of 'on-task' behavior and 'off-task' behavior as a function of instructional setting.

Table III-5

'On-Task' Behavior and Instructional Setting

	Percent of Students 'On-Task'	Percent of Students 'Off-Task' 25% or more of Lesson Time
Regular Instruction	79	19
Pullout Instruction	85	14
In-Class Instruction	75	22
Self Contained Classroom	78	18

Source: Report 18, Table 4-[illegible]

It will be seen that there is somewhat more 'on-task' behavior among pullout groups than in other settings and that somewhat fewer of the students are 'off-task' in the pullout setting. The observers noted the apparent reason for the 'off-task' behavior and reported that about 45 percent of it was self-initiated as evidenced by day-dreaming, leaving the instructional group, and similar activities, about 30 percent for the regular classrooms and about 20 percent for the pullout 'off-task' behavior was caused by distractions from another student, about 10 percent by lack of assignment or unclear directions, about 5 percent by external disruptions and the remainder by miscellaneous sources. Again we see that the pullout instruction seems superior to regular instruction.

Report 18 contains a number of other measures of activities taking place in the classroom and relates them to the setting in which instruction is given. For example in both regular and pullout instruction about 75 percent of the teachers' time is spent in actual instruction, about 20 percent is spent in behavior management. Table 4-5 of Report 18 reports on classroom atmosphere as evidenced by such items as teachers making negative comments, efficiency of instruction, classroom tension/harmony, etc. These are reported in terms of the instructional setting. Generally the results tend to favor pullout instruction.

Table 4-6 of Report 18 summarizes all of the observations made in different classroom settings and attempts to determine the favorableness of different classroom settings in terms of their presumed positive impact on learning. In 96 of the 120 comparisons, pullout instruction ranks ahead of the other three instructional settings. It thus appears that the instructional setting in which most CE students receive their special instruction is one which should be conducive to learning.

ARE THE TYPE AND CONTENT OF INSTRUCTION DIFFERENT FOR TITLE I AND REGULAR STUDENTS?

We have seen that the services given Title I and regular students differ in terms of total hours of instruction, size of class, experience of the teachers, and the setting in which instruction is given. We will now examine the instructional practices used by teachers to see if the way instruction is given differs between Title I students and regular students in the same schools.

Teachers were asked a series of questions about how they gave instruction in reading and math. Teachers were asked, "To what extent are the following aspects of your reading (or math) instruction basically the same for all or most of your students?" They could answer "basically the same for most of the students" or "tends to vary among students." Table III-6 shows the percentages of students whose teachers reported that instruction varied in a

Table III-6

Percentage of Title I and Regular Students in Title I Schools Whose Teachers Report That Instruction Varies Among Students

	Reading		Math	
Type of Instruction:	Title I Students	Regular Students	Title I Students	Regular Students
Total Time in Subject	32	29	32	23
Instructional Objectives	62	54	50	37
Sequence of Activities	56	48	46	34
Expected Rate of Progress	91	92	89	85
Teaching Method	72	69	64	54
Types of Instructional Materials	68	62	56	44
Content of Instruction:				
Based on Approved Curriculum	33	43	32	46
Based on tested needs assessment	19	11	22	10
Both approved curriculum and needs	48	46	45	43

Source: Report 5, Tables 4-20 and 4-21.

number of areas. In contrasting Title I students and regular students we see that there were a number of areas where instruction varied more for Title I students than for regular students: the amount of time spent in instruction tended to be more variable for Title I students, particularly in math; the instructional objectives tended to be more variable for Title I students; the sequence of activities was more variable, again particularly in math, as were the teaching methods and the types of instructional materials. Most teachers of both Title I students and regular students expected the students to show equal amounts of variation in their rates of progress. In terms of the content of instruction there was considerable variability. There was considerably less use of an approved curriculum for Title I students than for regular students. In the case of Title I students there was more frequent use of a curriculum devised in terms of a test-based needs-assessment rather than use of a standard approved curriculum. As grade increased there was much less use of the approved curriculum for Title I students and much greater resort to instructional material based on a needs-assessment. Table III-6 shows that there is a noticeably greater effort to individualize the type and content of instruction for Title I students than there is for regular students. Many believe this should be a positive factor leading to greater learning.

ARE THE READING AND MATH ACTIVITIES OF TITLE I STUDENTS DIFFERENT FROM THOSE OF REGULAR STUDENTS?

As this chapter progresses we are examining in finer detail the activities that teachers use to instruct their students. It is the actual process of instruction that determines the intellectual content or material that the student receives. Teachers were asked to describe the frequency with which they engaged in a variety of instructional activities. There were twelve different reading activities that the teachers described as being used "very frequently" (scored 5) to "never or almost never" (scored 1).

A number of activities were used with great frequency in the first grade, but with progressively declining frequency at successive grades. These activities which tended to be used more frequently with Title I students than with regular students, were:

Identifying and practicing letter-sound correspondence
Identifying and writing letters or groups of letters

Blending sounds letters stand for to form words
Learning and practicing sight words
Reading texts orally

These are all basic activities and are ones students start with in the first grade, where these activities were rated about 4.5 on a five-point scale. While these activities decrease with grade they are still used "sometimes" in the sixth grade.

Similarly there was a group of activities used relatively infrequently in the first grade, but its used increased in the higher grades. These activities were:

Dividing words into syllables
Answering comprehension questions based on timed reading
Using reference materials such as dictionaries and encyclopedias

These are more complex activities than those in the previous list. There is some tendency for regular students to engage in these activities more frequently than Title I students, as might be expected since the regular students are achieving at a higher level. Finally there was a group of activities that showed no changes with grade. The following two activities were engaged in frequently throughout the elementary grades:

Using context clues to gain meaning
Answering questions requiring comprehension

The following activity was low in the first grade and then at the "sometimes" level in the remaining grades:

Reading and writing stories created by self or other students

In summary, there are a number of different processes used in teaching reading. Basic processes are used very frequently in the lower grades but are used with decreasing frequency as grade progresses. However, Title I students at the higher grades continue to be instructed through the use of basic activities more than do regular students. More complicated reading processes are used infrequently in the lower grades and more frequently in the higher grades. There is a slight tendency for Title I students to be instructed in these activities less frequently than regular students.

Since learning to read is such an important part of a child's education, we gathered extensive data on teachers' practices in teaching reading. We wanted to see if teachers used different practices in teaching Title I students from those they used with regular students. We have just seen that there are significant differences in the activities that are most frequently used. We went further and attempted to see within these activities if there were particular approaches favored in teaching Title I children. For each approach teachers were asked to indicate whether the approach was "used as a major approach," which was scored 3; was "used as a secondary approach," and was scored 2; or was "not used," and scored 1. Listed below are approaches that increase with increasing grade and which are also used more frequently with Title I students. The approaches are listed in the order of the difference in their use for Title I and regular students.

1. An approach that uses a modified alphabet system which either augments or marks the regular alphabet so that it corresponds more closely to the sounds of the language.
2. A self-instructional approach that uses a series that presents material in 'frames' containing small bits of information to which the children are asked to respond. Immediate confirmation as to the correctness of their answers is given in the text.

3. An approach in which children select their own reading materials, such as library-type books, and receive instruction primarily through teacher-child conferences.

4. An approach that uses a reading series and/or library-type books to teach forms of literature and literary appreciation.

5. An approach in which children read their own writings. These 'stories' provide the material on which reading instruction is based.

6. An approach that includes reading in the content fields, such as science and social studies; teaching of study skills, such as how to use tables of content, indices, graphs, dictionaries, encyclopedias, etc.; and instruction in how to organize materials into outlines, summaries, and reports.

There was only one approach that was used more frequently in the first few grades and was then used less frequently as grade increased. This approach was also one which was used by teachers of Title I students much less frequently than with regular students.

7. An approach that uses a graded reading series containing a vocabulary based upon words that occur frequently in the language. New words are introduced by sight and by a phonic analysis presenting the letter-sound relationship of consonants before that of vowels.

These were two approaches that were used as frequently in the higher grades as in the lower grades; these approaches were used significantly more frequently with Title I students than with regular students.

8. An approach that uses a graded reading series containing a vocabulary based primarily upon words that are regularly spelled. The most common patterns, those containing short vowels, appear first, a typical sentence in an early reader being: Nat is a fat cat. Gradually,

more complicated, less frequent patterns are introduced. New words are learned by analysis of spelling patterns or by sounding and blending.

9. An approach that uses a graded reading series containing vocabulary that rapidly introduces the letter-sound relationships of all the sounds in the language. Long and short vowels are introduced at the onset. New words are learned by sounding and blending.

Finally, approach 10, below, differed by having one trend for Title I students and a different one for regular students. This approach was used with equal frequency for both groups in the first grade, increased with frequency of use in the second grade, and for regular students continued to increase to the sixth grade. But with Title I students its use decreased after the second grade and was lower in the sixth grade than it had been in the first grade.

10. An approach that uses a reading series and/or other books to teach both literal comprehension and understanding of implied meanings in the text.

The previous results have been presented in terms of changes in frequency of use of the approaches as grade changes and in terms of the size of the differences in use with Title I and regular students. This presentation may give a wrong impression regarding the frequency of use of the various approaches. The frequency of use varies greatly from the first grade to the sixth. In the first grade the same approaches tend to be used with Title I students as with regular students, but the differences increase with grade. The following list gives the rank order of the frequency of use of the approaches for Title I and regular students in the first grade. The approach listed first is the most-used approach while the last one is least used. (In the list the number is the one used in the text above to identify the description of each approach while the short sentence is a capsuled statement of the major characteristics of the approach.)

Title I Students in the First Grade	Regular Students in the First Grade
Graded sight phonic analysis (7)	Graded sight phonic analysis (7)
Graded letter-sound relationships (9)	Literal and implied comprehension (10)
Literal and implied comprehension (10)	Graded letter-sound relationships (9)
Graded spelling, sounding/blending (8)	Graded spelling, sounding/blending (8)
Literary forms and appreciation (4)	Literary forms and appreciation(4)
Students read own writing (5)	Students read own writing (5)
Modified alphabet (1)	Students select own materials (3)
Students select own materials (3)	Self instruction with reinforcement (2)
Reading in content fields (6)	Reading in content fields (6)
Self instruction with reinforcement (2)	Modified alphabet (1)

In the list for the sixth grade the contrast between the approaches used for Title I students and regular students is striking. The first three approaches used with Title I students are the last three used with regular sixth grade students. The three most-used approaches with regular students are the last three approaches used with Title I students. The most-used approaches used with regular students in the sixth grade are advanced approaches, that is, they assume a mastery of elementary reading and emphasize comprehension, literary form, and content-field reading. The first three approaches with Title I students are different. Title I students who are having reading difficulty are exposed to approaches emphasizing modified alphabet, self instruction, and reading their own writing. And this is no fluke of the data. The list for the fifth grade is almost identical to that for the sixth grade, with the first three items for the fith grade being the same ones as for the sixth grade for both Title I students and regular students. It seems that Title I students are much more frequently taught by special teachers and aides and are assigned to self-instruction and the reading of their own writing in the higher grades.

In summarizing this material it is clear that both the activities engaged in and the approaches used vary considerably with grade. Some practices are used more frequently as grade increases, others are used less frequently, and some retain about the same frequency. For many of the teaching practices there are clear differences in the activities and approaches used with Title I students and with regular students, and these differences vary with grade.

For math the trends are not as strong as they are in reading. The activities that are used relatively frequently in the lower grades and less frequently in the higher grades are, in the order of their frequency of use:

Learning about number sentences
Learning about sets
Learning symbols
Working with math games
Working with physical models

To those of us who have not directly observed the changes in elementary school curricula over the years, this may be a surprising list.

The activities that are low in the first grades and increase as grade increases are, again in order of most use:

Reviewing computational skills
Learning about number theory
Learning about measurement
Learning properties and axioms

Activities which are flat and ordered from high to low use are:

Learning about fundamental operations
Learning math vocabulary
Learning geometric concepts
Learning about structure of number systems

One final activity, solving word problems, starts with a low frequency in the first grade, increases through the second, third and fourth grades, and then decreases. There are small differences between Title I and regular students in terms of the activities used in their math instruction. Relative to regular students, Title I students receive more "learning about the structure of number systems," "working with math games," "working with physical models," and "learning about sets."

DO TEACHERS USE MATERIALS AND EQUIPMENT DIFFERENTLY WITH TITLE I AND REGULAR STUDENTS?

In teaching reading and math, teachers use a number of different approaches. They all use some kinds of materials and equipment. Among the materials used by teachers are regular texts, supplemental readers, 'free reading' books, reference books, workbooks, dittos, programmed texts, games, puzzles, geoboards, and many others. We compared the use of these materials for regular students and low achieving students and found some differences although all these materials were used with all kinds of students. There was a slightly lower use of texts with low-achieving students and a slightly larger use of programmed materials. Generally it seemed that the low-achieving students were given more instruction with materials in addition to the regular text. The same tendency was definitely the case with equipment such as sound projectors, individual viewing equipment, tape recorders, listening centers, special reading machines, study carrels, etc. Title I students receive more instruction through the use of equipment than do regular students as is shown in Figure III-14. If such use of equipment is effective Title I students should certainly show achievement improvements.

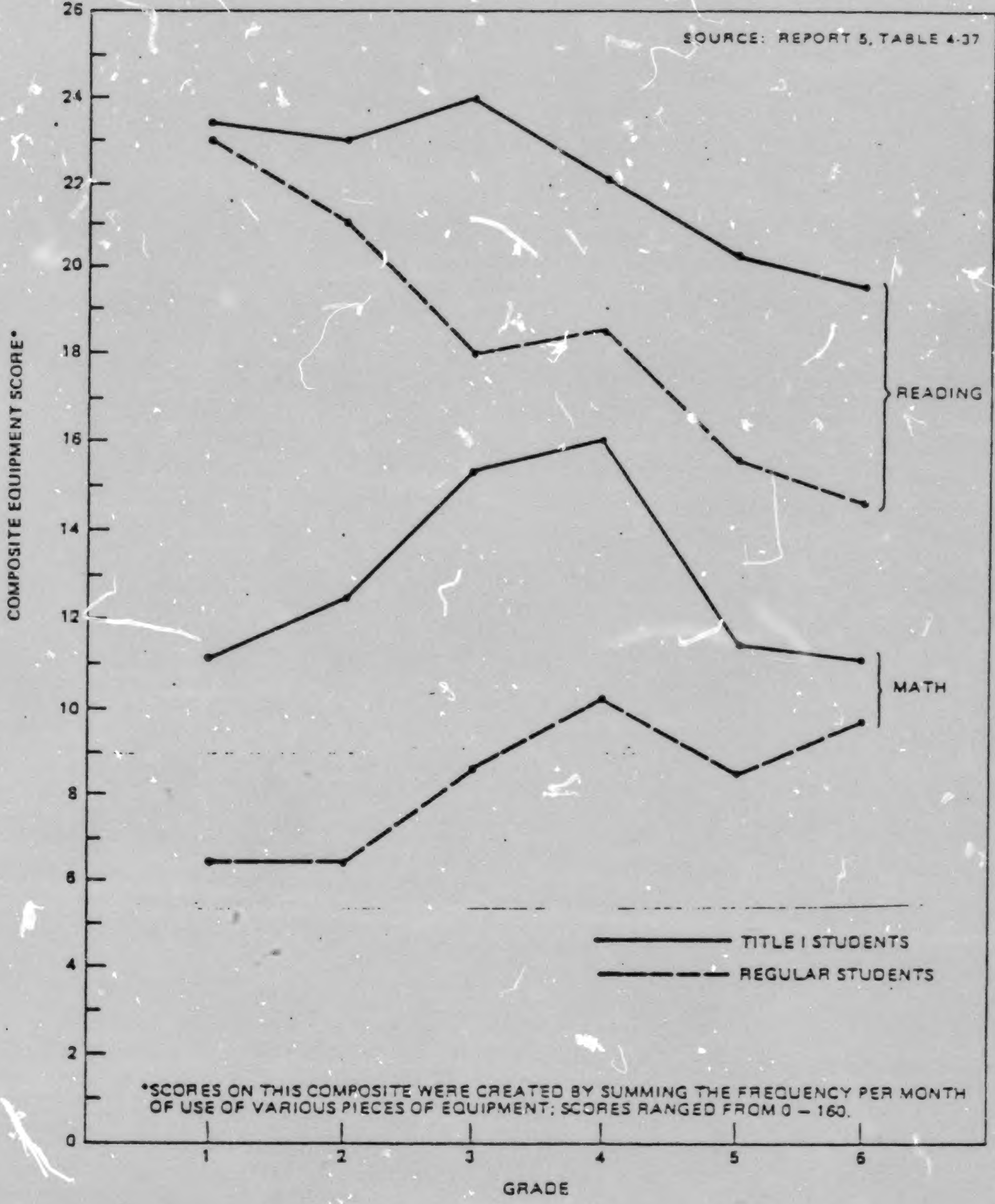


Figure III-14

Use of Reading and Math Equipment by Title I and Regular Students in Title I Schools

What is compensatory education? There is no single thing that can be called compensatory education. It is a whole collection of things that are different in the education of Title I students than would have been the case if they had been regular students.

Our results show that there are clear and significant differences in the instruction received by Title I students and regular students. In Chapter V we will see whether there is evidence that these differences lead to greater achievement.

Chapter IV. WHO RECEIVES COMPENSATORY EDUCATION?

Summary

Based on economic data gathered by home interviews, and achievement data based on achievement tests, it was possible to determine the percentages and numbers of students receiving Title I and other CE services in terms of poverty and academic achievement classifications. The results show that:

- *Among economically poor students 40 percent received CE while 60 percent did not. Among the non-poor students 21 percent received CE while the remainder did not.*
- *Because there are many more non-poor students than poor students, the absolute number of non-poor students receiving CE is larger than the number of poor students receiving CE. In 1976-77 there were about 1,230,000 poor students and 1,693,000 non-poor students receiving Title I.*
- *There were about 2,500,000 poor students who did not receive any CE.*
- *Among low-achieving students 46 percent received CE while 54 percent did not. Among regular-achieving students 19 percent received CE.*
- *Because there are many more regular students than there are low-achieving students, the absolute number of low-achieving students receiving CE is smaller than the number of regular-achieving students receving CE. There were about 1,200,000 low-achieving students and 1,300,000 regular-achieving students receiving Title I.*
- *About 2,000,000 low-achieving students did not receive any CE.*
- *Among students who were both poor and low achievers, 40 percent received CE while 60 percent did not. Other comparisons show that there were significant numbers of non-poor, regular achievers who received CE.*

- *Relative to their number in the total student population, the students most likely to receive CE services were Hispanic and black, were in large cities and rural areas, and were in the West and Mid-Atlantic regions (although if only Title I is considered, the largest proportion were in the South).*

- *Schools are selected for CE funds by a number of different criteria but the most frequently used are free or reduced-price lunch counts and/or AFDC enrollment. Within schools, students are most frequently selected in terms of teachers' judgments or test scores.*

- *Several targeting indexes are presented that measure the efficiency with which schools select students for CE.*

INTRODUCTION

Title I of the Elementary and Secondary Education Act was first authorized and funded in 1965; by 1980 it was distributing over three billion dollars annually. Title I funds are received by all the states and by 96 percent of the nation's school districts. As McLaughlin (21) points out, the original Title I authorization was supported by a mixed and powerful constituency. Those whose major concern was with poverty and ways of alleviating it believed that the funds would go to poor schools and districts and thus directly help the poor. Those who were principally concerned with improving the education of low-achieving students felt that the funds would help such students and thus they supported the Title I program. It was assumed that there was a close relationship between poverty and low educational achievement. McLaughlin makes the point that:

> "Senator Robert Kennedy did not share the general euphoria that pervaded Washington when the 1965 Elementary and Secondary Education Act (ESEA) was ratified. ESEA was enacted with high hopes for benefiting disadvantaged children. Title I of that act, which targets more than $1 billion a year to 'meet the special educational needs of educationally deprived children,' was the particular cause of excitement and self-congratulation on the Hill. It had broken through the long-standing opposition to federal aid to education and was viewed as an effective way to 'break the cycle of poverty.' Lawmakers were confident in 1965 that schoolmen knew what to do with the added resources, and that they would thereby establish effective compensatory programs for poor children. Title I was perceived as a central part of President Johnson's War on Poverty.

> Reports from some of Senator Kennedy's constituents, however, counselled against such optimism. He concluded that some schoolmen might not use the new Title I dollars in the best interest of poor children unless the act included some way to insure that they would not be cheated of the special attention intended by the legislation."

Those who were mainly oriented toward poverty considerations were able to specify a funds-allocation formula that would assure that the money was spent in poor districts and schools. Funds are first allocated to states as a function of the number of poor families in the districts of the state, the number of mothers receiving assistance under Aid for Families with Dependent Children, the number of neglected and delinquent children in schools and institutions, and several other poverty-related considerations. Similar criteria are used by the states to allocate money to the school districts. Based on the amount of money received, the districts select schools to receive money or resources depending on various poverty criteria. However, at the school level the criteria for allocating resources to students become clouded because of the need to consider what other resources the school is receiving, say from the Emergency School Aid Act, or from state programs. However, those concerned with poverty could be quite pleased that Title I funds were targeted toward the poor communities throughout the nation.

There was, however, an important group that felt that the targets of Title I funds should be children with low educational achievement. After all, Title I was an educational program. Was the assumption that there was a high correlation between economic need and educational need really true? By 1974 questions about this assumption had enough force that Congress decided that there should be a study to determine the economic and educational status of students participating in Title I programs. In the Educational Amendments of 1974 Congress mandated the Participation Study, by saying:

> "In the case of programs and projects assisted under Title I of the Elementary and Secondary Education Act of 1965, the report under this subsection shall include a survey of how many of the children counted under Section 103 (c) of such Act participate in such pro-

> rams and projects, and how many of such children do not, and a survey of how many educationally disadvantaged children participate in such programs and projects, and how many educationally disadvantaged children do not."

While Congress specifically authorized a study focusing on Title I students, Title I operates within a school environment with other compensatory education programs as well as the regular school program. The general idea is that compensatory education (CE) consists of instruction in addition to regular instruction. It is given to students who have received the regular instructional program and are having trouble progressing at the expected rate. But as soon as one moves from the general concept to specifics, troubles arise. How does one judge that a student is not progressing at the expected rate? Also, there are many special programs in addition to the regular program. Which are the CE programs? There is Title I, Follow Through, English as a Second Language, Services to Migratory Children, Services to Handicapped Children, the Emergency School Aid Act, Programs for American Natives, special state programs, special district programs, etc. Are all of these CE, and are the different activities funded under them properly called CE? In Chapter III we described the CE instructional program. For the purposes of this Chapter, CE is defined as an instructional program providing services that are different from, or in addition to, the services provided to regular students. While this definition seems straightforward, it has a number of difficulties when applied to individual students and programs. The interested reader may refer to Report 9 (p. 69 ff) for discussion of the problems we encountered when we tried to determine which students were CE students.

In the Participation Study we were mainly concerned with the Title I Program but we also had to consider other programs. Frequently Title I students receive services from several programs. Also, the nature of the Title I program in a school is affected by the other programs in the school. All of these considerations affected the design of the Participation Study.

THE DESIGN OF THE PARTICIPATION STUDY

The basic idea of the Participation Study was to determine the number of children in the nation's elementary schools who were receiving Title I services and came from poor families, and also how many children were from poor families and were not receiving Title I services. In other words we were to determine the relationship between receipt of Title I services and poverty status.

Similarly, we were to determine the relationship between receipt of Title I services and educational status. In the law authorizing the study, Congress defined poverty in the same terms as those used to determine poverty for the allocation of Title I funds. They also defined students as being educationally disadvantaged if they were one or more years below grade level. Thus, to undertake the study we had to do three things:

1. Obtain a sample that was representative of the nation's children in elementary school.
2. Determine the poverty status of the families from which the children came.
3. Determine the educational status of each child in the sample.

THE SAMPLE AND HOME INTERVIEWS

To determine the poverty status of the children in the sample it was necessary to conduct a home interview with the parents of each student. Since home interviews are expensive, we had to balance expense against the desired accuracy of the national projections to be made as a result of the home interviews. It was decided that a representative sample of 15,000 parents would be interviewed. It will be remembered from Chapter II that one of the samples for the Longitudinal Study was a Representative Sample. This sample included 243 schools that were representative of the nation's elementary schools. A random sample of students was drawn from each of these schools.

Interviewers visited the parents of these students and asked a series of questions regarding the economic status of the family, the attitude of the parents regarding their children's school and the education they were receiving, the amount of time the child spent doing homework, the extent of parental assistance with school work, the child's leisure activities, and other educationally related questions. For a full discussion of the sampling procedure and the content of the home interview the reader is referred to SES Report 2.

The Determination of Educational Disadvantagement

As a part of the Longitudinal Study, math and reading subtests of the Comprehensive Tests of Basic Skills were given to every child in the sample. Since the sample for the Participation Study was a subsample of the sample for the Longitudinal Study, the achievement test scores were available for each student. Congress had defined educational disadvantagement in terms of grade equivalents, a measure that has several psychometrically undesirable characteristics. As a result the grade equivalent score for each student was determined, but we also ascertained the percentile score and vertical-scale score for each student. More details regarding the determination of educational status can be found in SES Report 2.

ECONOMIC STATUS AND SELECTION FOR COMPENSATORY EDUCATION

Congress wanted to know several things. It wanted to know, from the population of poor children, how many were receiving CE services and how many were not. It also wanted to know how many students were receiving CE services who were not poor. Whether or not a student came from a family that was poor was determined by applying the Orshansky index to information collected during the home interview.* Table IV-1 shows both the percentages of students receiving CE when classified as poor or non-poor and also the estimated total numbers of such students. Note that students are classified as receiving Title I or Title I and/or Other CE, Other CE only, no CE at a school having CE, or no CE at a school which does not offer CE.

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*AFDC was also included.

Table IV-1

Percentage and Number of Students Receiving Various CE Services by Family Economic Status

Economic Status	CE Status				
	Title I or Title I and other CE	Other CE only	No CE at CE School	No CE at Non-CE School	Total
Poor	29%	11%	53%	7%	100%
Non-Poor	11	10	64	16	101
		Number of Students			
Poor	1,230,000	443,000	2,199,000	309,000	4,181,000
Non-Poor	1,693,000	1,551,000	10,065,000	2,516,000	15,825,000
Total	2,923,000	1,994,000	12,264,000	2,825,000	20,006,000

Source: Report 2, Table II-1.

What message can be drawn from this table? The interpretation of the numbers varies depending on one's expectation as to whether or not CE should go primarily to poverty-level students. Forty percent of all poverty-level students receive some kind of CE, but 21 percent of the non-poverty-level students are also receiving CE. One can reflect that, percentage-wise, twice as many poverty-level students as non-poverty-level students receive CE. But in terms of the total number of students, there are about 16 million non-poverty-level students and about 4 million poverty-level students; of these, there are about 1,690,000 non-poverty-level and 1,230,000 poverty-level students receiving Title I. Thus, more non-poverty-level than poverty-level students receive Title I. Or to look at the other side of the coin, 60 percent of thepoor students and 80 percent of the non-poor do not receive Title I. In terms of the total number of students, about 2.5 million poor students do not receive CE, while about 12.5 million non-poor students do not get CE. Roughtly speaking, there are about 1.7 million poor students receiving CE, and about 2.6 million poor children not receiving it. In brief, in absolute numbers, there are somewhat more non-poor than poor students receiving CE. (These figures are for Title I and Other CE combined. The picture is similar for Title I considered separately.)

In this bad? It depends on what students one thinks should be targeted to receive Title I services. Remember that the funds go to poor districts and schools, but the individual students selected to receive Title I services are selected on the basis of educational need, not in terms of economic status. Furthermore, the definition of poverty is such that only the lowest 21 percent of the students are classified in the poverty group. One might speculate that the vast majority of those receiving CE and classified as non-poor are just above the poverty level. Table IV-2 indicates that this is not the case.

It will be seen that there is a progressive decrease in the percentage of students receiving Title I services as family income increases. A similar but less marked tendency is evidenced by the numbers for "Other CE only." Since Title I is more of a poverty program than most other CE programs this is the relationship we would expect to see. However, the idea that non-poverty students selected for CE are hovering just about the poverty line is dispelled by the table. Clearly there are significant percentages of CE students who are not in the two lowest fifths of family income. As will be seen in the next section, the correlation between student income status and educational achievement status is relatively low. Thus, to the extent that students are selected for CE programs on the basis of their educational need,

Table IV-2

Percentage and Number of Students Receiving Various CE Services by Family Income.

Family Income	Title I or Title I and Other CE	Other CE Only	No CE at a CE School	No CE at a Non-CE School
Lowest Fifth	37%	21%	17%	13%
Second Fifth	24	27	18	18
Third Fifth	17	21	20	22
Fourth Fifth	13	16	22	22
Highest Fifth	8	14	23	25
		Number of Students		
Lowest Fifth	1,090,000	428,000	2,070,000	360,000
Second Fifth	702,000	534,000	2,226,000	514,000
Third Fifth	507,000	427,000	2,460,000	616,000
Fourth Fifth	390,000	320,000	2,695,000	616,000
Highest Fifth	234,000	285,000	2,813,000	719,000
Totals	2,923,000	1,994,000	12,264,000	2,825,000

Source: Special tabulation for the final report.

we would expect many of those selected to come from non-poor families, even though they are enrolled in schools with relatively high percentages of poor students.

POVERTY AND THE CHARACTERISTICS OF STUDENTS SELECTED FOR CE

We have already seen that proportionately more poor than non-poor children are selected for CE. What about some of the other student characteristics, such as race, urbanism and region of the country? Sometimes it is thought that CE programs are primarily for black children in the ghettos of large cities. As can be seen from Table IV-3, that is not the case. If we combine the number of students receiving CE under Title I and from other CE funds* we see that, among poor whites, 37 percent receive CE; among poor blacks, 40 percent receive CE; and among poor Hispanics, 47 percent have CE services. At the same time we find for the non-poor that 19 percent of the whites, 27 percent of the blacks, and 44 percent of the Hispanics receive CE. Looking at the poor and the non-poor together, we see that proportionately somewhat fewer whites than blacks, and somewhat fewer blacks than Hispanics receive CE. There are, however, classification problems in presenting the results in this fashion. Although we instructed the teachers not to count those participating in bilingual programs as CE students, we suspect that some teachers did so, and this accounts for the relatively high percentage of Hispanic students listed in the "Other CE only" category. Likewise, among the non-poor, it is probable that the blacks and Hispanics are lower in the economic status scale than are the whites, and thus more near-poor blacks and Hispanics receive CE. Thus, it seems probable that about the same proportion of blacks and Hispanics receive CE and that relatively more of them receive CE than whites.

As already noted, it is frequently thought that CE is a program for students in large city ghettos. Table IV-4 shows that this is not the case, although there are many CE students in large cities. The percentage of those receiving Title I and "Other CE only" combined, among the poor, is 46 percent for rural areas, 45 percent for cities over 200,000, 35 percent for cities under 50,000, 34 percent for suburbs, and 28 percent for cities from 50,000 to 200,000. The order is the same for the non-poor, with 26 percent for rural, 24 percent for cities over 200,000, 19 percent for cities under 50,000, 17 percent for suburbs, and 15 percent for cities from 50,000 to 200,000. The number of

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*From the point of view of equality of services, it is not quite appropriate to add together those receiving Title I and those receiving CE service funded from other sources. The costs of service under "Other CE only" is about a quarter less than under Title I.

Table IV-3

Percentage of Students Receiving Various CE Services by Family Economic Status and Racial/Ethnic Group

Economic and Racial/ Ethnic Status	CE Status				
	Title I or Title I and Other CE	Other CE Only	No CE at CE School	No CE at Non-CE School	Numbers of Students
Poor and:					
White	27%	10%	55%	8%	2,011,000
Black	33	9	51	7	1,501,000
Hispanic	29	18	51	2	556,000
Other	38	6	35	20	113,000
Non-Poor and:					
White	9	10	65	16	13,546,000
Black	19	8	55	18	1,266,000
Hispanic	24	18	54	5	696,000
Other	5	5	43	47	317,000
Total	2,941,000	2,000,000	12,264,000	2,801,000	20,006,000

Source: Report 2, Table II-3.

Table IV-4

Percentage of Students Receiving Various CE Services by Family Economic Status and Urbanism

Economic and Urbanism Status	Title I or Title I and Other CE	Other CE Only	No CE at CE School	No CE at Non-CE School	Number of Students
Poor and					
City over 200,000	33%	12%	50%	5%	1,334,000
Suburbs	18	16	61	5	238,000
City from 50,000 to 200,000	15	13	52	20	443,000
City under 50,000	27	8	57	8	1,133,000
Rural	36	10	49	5	1,033,000
Non-Poor and					
City over 200,000	16	8	65	11	1,757,000
Suburbs	5	12	68	15	2,421,000
City from 50,000 to 200,000	5	10	50	35	2,105,000
City under 50,000	12	7	66	15	4,969,000
Rural	13	13	64	10	4,573,000
Total	2,941,000	2,000,000	12,264,000	2,801,000	20,006,000

Source: Report 2, Table 11-8.

students from rural areas receiving CE outnumbers that for any other category. The percentages for the suburbs tend to be lower than for large cities and rural areas, but there is still a sizable number of students receiving CE in the suburbs. While there is a trend for CE to be most prevalent in the large cities and rural areas, it is significant that there are sizable numbers of CE students throughout the country, irrespective of the population density of the area in which they live.

While some say that CE is for the ghetto, others think of it in terms of a program for "the poor rural south." Again this is not in accord with the facts. Table IV-5 shows the percentage of students receiving services by region of the country. If Title I services and "Other CE only" are combined, among the poor, 51 percent of the students in the West, 42 percent in the Mid-Atlantic, 41 percent in the South, 38 percent in the Northeast, and 30 percent in the Midwest receive CE. The picture among the non-poor is different than it is for the poor. For the non-poor, the Northeast with 31 percent and the West with 26 percent are considerably higher than the other areas, which are quite close together, with the Mid-Atlantic and the Midwest both having 17 percent, and the South having 15 percent. To understand this, it is worthwhile to look at the Title I and the "Other CE only" figures separately. Among the poor, is is noticeable that the percentage for Title I in the South is much higher than elsewhere in the nation. Associated with this is the fact that the South is lowest in "Other CE only," reflecting the fact that there are few local or state CE programs in the South. In fact the percentage of students receiving Title I services, both for the poor and the non-poor is fairly similar thoughout the country, except for the South. The big differences are in the "Other CE only" category where the South and Midwest have few programs, in contrast to the West and Northeast, which have the most. The relatively larger number of students receiving Title I services in the South is probably a reflection of the relatively lower economic status of the South and the influences of the Title I allocation formula that allocates larger sums to states having more poor families.

Table IV-5

Percentage of Students Receiving Various CE Services by Family Economic Status and Geographic Region

Economic and Regional Status	CE Status				
	Title I or Title I and Other CE	Other CE Only	No CE at CE School	No CE at Non-CE School	Number of Students
Poor and					
Northeast	24%	14%	59%	3%	853,000
Mid-Atlantic	24	18	49	10	330,000
South	38	3	50	9	1,443,000
Midwest	24	6	63	6	832,000
West	27	24	39	10	723,000
Non-Poor and					
Northeast	10	21	56	13	2,994,000
Mid-Atlantic	9	8	75	8	2,057,000
South	11	4	65	20	3,988,000
Midwest	11	6	72	11	4,478,000
West	11	15	46	28	2,358,000
Total	2,941,000	2,000,000	12,264,000	2,801,000	20,006,000

Source: Report 2, Table II-9.

Report 2 examines other student characteristics relative to selection for CE services, but there are fewer interesting trends. There are slightly more male than female CE students, about a 4-percentage-point difference. Also, there tends to be slightly more CE offered to students in the second, third and fourth grades than to those in the first grade or in the fifth and especially the sixth grade.

In summary, poor students are more frequently selected to receive CE services than non-poor students, but because there are more non-poor than poor students, there are larger numbers of non-poor students receiving CE. Relatively, there are more Hispanic than black students, and more black students than white students receiving CE, but in terms of absolute numbers, there are more white students than black students receiving CE, and more black students than Hispanic students receiving CE. Again, in terms of percentages, there are more CE students in rural areas and large cities than there are in medium- and small-sized cities. The percentage of students receiving Title I services is quite uniform over the regions of the country. except for the South, where there is a much higher percentage receiving Title I. But when "Other CE only" is included a different picture emerges. The South has a very low percentage of students in these other programs while the West and the Northeast have high percentages. It appears that other federal agencies, and the state and local governments, are funding sizable programs in the West and the Northeast, and to a lesser extent in the Mid-Atlantic area, while there are few such programs in the Midwest and even fewer in the South.

EDUCATIONAL ACHIEVEMENT AND SELECTION FOR CE

Schools are selected for receipt of Title I resources based on the economic status of the populations they serve. But once a school receives Title I resources the students are selected to receive Title I services on the basis of educational need. Title I regulations give guidelines as to which students should be selected. Generally, it is expected that the most educationally needy students will be selected first and that the students selected will be in the bottom half of the achievement distribution. But within these broad guidelines the actual selection of students is left up to the local district and school authorities. Thus, from locale to locale, one finds considerable variation in the achievement level of students selected.

In the Participation Study all the students took the Comprehensive Tests of Basic Skills in reading and math in the fall and again in the spring. Based on the scores obtained from the several administrations, scales were developed which allowed us to convert raw scores into percentiles and into vertical-scale scores, and to determine the score corresponding to the median for each grade. This median score was necessary because, for the purpose of this study, educationally disadvantaged children were defined by Congress as "children who are achieving one or more years behind the achievement expected at the appropriate grade level for such children." Table IV-6 shows the percentages and numbers of students in various CE categories in terms of grade equivalents as measured by the CTBS.

Table IV-6

Percentage and Number of Students Receiving Various CE Services by Educational Achievement Status

Educational Achievement	CE status				
	Title I or Title I and Other CE	Other CE Only	No CE at CE School	No CE at Non-CE School	Total
Low Achievers*	31%	15%	42%	12%	100%
Regular Achievers	10	9	66	15	100%
	Number of Students				
Low Achievers	1,188,000	577,000	1,576,000	456,000	3,797,000
Regular Achievers	1,307,000	1,068,000	8,245,000	1,948,000	12,568,000
	2,495,000	1,645,000	9,821,000	2,404,000	16,365,000

*Omitting the first grade, since it does not fit into the definition of having students "one grade level below."

Source: Report 2, Table 3-1.

It will be seen that in terms of percentages there are many more students selected for CE services who are performing at least one grade level below their assigned grade level than there are among higher-achieving students.

Forty-six percent of the low-achieving students* are selected for some CE while only 19 percent of the regular students are selected. At the same time, 54 percent of the low-achieving students are not receiving CE services. In terms of absolute numbers, about 2 million low-achieving students are not receiving extra services, in contrast to about 1.75 million who are receiving CE services. It should also be noted that about 2.4 million high-achieving students are receiving CE services. It is clear that many students are receiving CE who are less educationally needy than the many needy students who are not receiving CE. We will see some of the reasons for this later when we consider the joint relations between economic status, which determine which schools receive CE funds (such as Title I) and educational status, which determines those students within a school who are selected.

There are a number of psychometric problems in defining achievement in terms of grade equivalents. For one thing, the first-grade students cannot be defined in terms of being one year below grade level. Also, the amount of variance or spread in student scores changes from grade to grade. For example, in the sixth grade there may be students three or more years below grade level, but in the second grade they can only be one year below. The result is that different percentages of students are included in one year below grade level as grade level changes. There are also other statistical problems. The interested reader is referred to Tallmadge, G.K., and Wood, C.T. (28), for a detailed discussion of the problems with using the grade equivalent metric. Because of these problems, we converted each student's raw score to a percentile and divided the distributions into quartiles. Table IV-7 shows the results.

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*"Low" and "Regular Achievers" are defined as achieving below or above one year below grade level. This definition was contained in the law authorizing the Participation Study. Selection of students for Title I is based on several criteria. The Title I regulations suggest that all children below the median be considered.

Table IV-7

Percentage and Number of Students Receiving Various CE Services by Achievement Quartiles*

Achievement Status	CE Selection Status				
	Title I or Title I and Other CE	Other CE Only	No CE at CE School	No CE at Non-CE School	Total
Bottom Quartile	32%	14%	42%	11%	99%
2nd Quartile	19	11	58	12	100%
3rd Quartile	7	8	70	15	100%
Top Quartile	2	6	75	17	100%
	Number of Students				
Bottom Quartile	1,579,000	718,000	2,110,000	560,000	4,967,000
2nd Quartile	910,000	543,000	2,809,000	605,000	4,867,000
3rd Quartile	368,000	411,000	3,600,000	762,000	5,141,000
Top Quartile	89,000	301,000	3,772,000	869,000	5,031,000
	2,946,000	1,973,000	12,291,000	2,796,000	20,006,000

*Derived from Table V-5, Report #2.

There is a clear tendency for there to be proportionately more CE students as achievement scores decrease. This is true of both Title I and "Other CE only." It should be noted that the percentage of students in the bottom quartile is very similar to the number in the previous table who are one year below grade level. (The absolute numbers between the two tables cannot be compared because Table IV-6 does not include first graders.) It appears that the selection of students corresponds reasonably well with the educational need of the students, but a fairly large number of students who do not seem to need CE are receiving it. About 450,000 Title I students, and 700,000 "Other CE only" students, are above the median in achievement and are receiving CE services. Some of these students may be misclassified due to the unreliability of the CTBS, but a similar number below the median should be classified above it, so the figures average out. Also, some of the CE selections are in schools which are 100 percent CE, which is allowed by Title I under certain conditions.

While significant numbers of educationally non-needy students receive CE, the more significant problem is the 2,700,000 students who are in the lowest quartile academically and who do not receive special services; or, if one believes that all students below the average should receive CE, one would be concerned with the 6,100,000 students who are in the bottom half in terms of achievement and do not receive CE. Clearly, if all students who are above the median and receive CE were to be replaced by students below the median there would still be sizable numbers of students below the median who would not receive CE services. The only way to assure that all students below the median receive CE is to dilute the services being given so more students could receive a little, or to increase the funds so that more students could be given services at the same intensity level as is currently practiced.

EDUCATIONAL ACHIEVEMENT STATUS AND THE CHARACTERISTICS OF STUDENTS SELECTED FOR CE

We have already examined the relationship between poverty status and the characteristics of students selected for CE. While at the student level the correlation between poverty and educational achievement is not high, it is considerably higher for school averages. Because of the higher correlation at the group level, we would expect the relationship between educational achievement status and the characteristics of students selected for CE to be fairly similar to that found when these same student characteristics are related to poverty. The achievement levels of students by race/ethnicity who are selected for CE were examined. The results show similar relationships to those found for poverty, although the trends do not seem to be quite as pronounced when students are classified by educational achievement.

Again there are some interesting trends in the relationship between achievement status and urbanism with respect to selection for CE. As with poverty, students from large cities and from rural areas are most frequently selected for CE services. This is true for students who are either low or high achievers.

On examining the relationships between geographic regions of the country and selection for CE, we again find that the Northeast and the West have the highest percentages of students selected for CE services, while the South has the lowest. Again, the South is low because it has so few students served by other federal, state or local programs. Almost all of the students served in the South are served by Title I.

THE JOINT EFFECT OF ECONOMIC STATUS AND EDUCATIONAL ACHIEVEMENT

It seems probable that the supporters of the Title I program assumed an almost one-to-one relationship between poverty status and educational achievement. It is widely believed that schools in poor areas have students who score poorly on achievement tests. But what is the actual relationship? In the Participation Study we were able to relate family income with achievement test scores. The overall correlation between economic level and achievement scores at the student level was .29, and varied, grade by grade, from .20 in the first grade to .32 in the third and fourth grades. Relationships of this magnitude are generally considered small-to-moderate and imply that if one knows a student's economic status one can predict the student's achievement level with only modest success. It is this low relationship that partially accounts for the finding, reported earlier, that many non-poor students perform poorly and are receiving CE. On the other hand, when groups of students are combined, say by taking the average achievement level for a school, then the combined average scores relate more highly. In fact, when the average family economic level for a school is correlated with the average student achievement level for students in a school, the correlation is .67. This means that if one knows the average poverty level of a school one can predict the average performance of students in the school much more accurately than one can predict the achievement level of any given student on the basis of the student's family economic level.

When schools are allocated CE funds based on poverty level, the students will tend to be low achievers if the school is within a poverty area, but there may also be many individual students who are regular achievers; and conversely, if schools are not given CE funds because of their relatively high economic levels, these schools will still probably contain many students who need CE services as indicated by their low achievements. Table IV-8 shows the mean achievement percentiles for students with various family incomes. This table illustrates the marked relationship between family income and achievement when data are grouped, but such grouped data mask the wide variation within any group. The large standard deviations emphasize this fact.

Economic status and achievement level are related to a number of other variables. As in the previous sections, we will examine the joint relationships among poverty, achievement level, and race, urbanism, and geographic region, and we will also consider the relationship of CE selection to the child's sex and mother's education. Table IV-9 shows the relationships between poverty, achievement and race. The average achievement percentile for whites is 56, while that for blacks is 32 and for Hispanics 31. "Others," who are largely Orientals, have an average percentile of 51. When examined in terms of poverty, the poor whites have an average score of 41, while that for non-poor whites is 57. In comparison the score for both the poor blacks and poor Hispanics is 27, while that for the non-poor blacks is 36 and for the non-poor Hispanics it is 34. It should be noted that the score for the non-poor blacks and Hispanics is below that of the poor whites. No doubt the economic level

Table IV-8

Students' Family Income and Achievement Level

Family Income	Mean Achievement Percentiles*	Standard Deviation	N
Below $5000	34	25	1524
5,000 to 7,000	37	25	1005
7,001 to 9,000	41	27	1109
9,001 to 11,000	45	28	1188
11,001 to 13,000	48	28	1234
13,001 to 15,000	52	28	1259
15,001 to 17,000	53	29	1248
17,001 to 19,000	57	28	1146
19,001 to 21,000	58	28	997
21,001 and above	62	27	3087

*There are technical statistical reasons why it is usually inappropriate to average percentiles; however, when used to show a trend, as is done here, the practice is less objectionable.

Source: Report 2, Table IV-6.

Table IV-9

Students' Family Income, Race, and Achievement Level

Race/Ethnic Group	Mean Achievement Percentile			N		
	Poor	Non-Poor	Total	Poor	Non-Poor	Total
White	41	57	56	1,192,000	10,598,000	11,178,0
Black	27	36	32	949,000	1,100,000	2,049,0
Hispanic	27	34	31	343,000	590,000	933,0
Other	33	56	51	70,000	260,000	330,0

Source: Report 2, Table IV-7.

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of the non-poor blacks and Hispanics is lower than that of the non-poor whites, but it is above the economic level of the poor whites. Children from black and Hispanic non-poor families need CE considerably more than children from the non-poor white families, but also more than those from many poor white families. The "Other" minorities are more similar to the whites than they are to the blacks and Hispanics.

Poverty level and the parents' formal education are linked, and children's achievement levels are also related to both economic status and the parents' education. Table IV-10 shows this relationship. It is seen that the percentile achievement level of children whose mothers had eighth grade educations or less is 32 and that the level of achievement progresses regularly to 70 for students whose mothers are college graduates.

Table IV-10

Students' Family Income, Mothers' Education, and Achievement Level

Mother's Education	Mean Achievement Percentile			N		
	Poor	Non-Poor	Total	Poor	Non-Poor	Total
Grade 8 or Less	28	35	32	793,000	917,000	1,710,000
Grade 9-11	31	44	40	892,000	2,269,000	3,161,000
Grade 12	38	55	53	635,000	5,518,000	6,153,000
Some College	48	62	61	185,000	2,382,000	2,567,000
College Graduate	60	70	70	50,000	1,409,000	1,459,000

Source: Report 2, Table IV-11.

The achievement of children from poor homes is considerably below that of their peers who are from non-poor homes but whose mothers had the same amount of formal education. The jump in scores between the children of mothers with an eighth grade education or less and those with a high school education is 21 percentile points, and that between high-school-educated mothers and college graduates is 17. The jump between children whose mothers had similar educations, but whose family income places them in the poor or non-poor category, is about 12. Thus, a mother's education seems to have a larger effect on her child's achievement than does her economic status.

Table IV-11 shows the relationship between economic status, academic achievement, and urbanicity. The table shows that, in general, the achievement level is near the 50th percentile except for the suburbs, where it is 59, and for the large cities, where it is 38. This very low score for the large cities means that they should have many students enrolled in CE programs, and indeed this is the case. But we have previously seen that rural areas also have many students in CE programs, and yet they have achievement levels slightly above the national mean. This probably reflects the relative poverty of rural areas, whereby they get relatively more Title I funds than would be indicated by the achievement levels of rural students. Within urban areas of the same size, there is a marked difference in the achievement levels of students from poor and non-poor families, with the children from poor families scoring about 17 percentile points below those from non-poor families.

The analyses done over regions of the country are shown in Table IV-12 and show both expected and unexpected results. As reflected by the overall figures, the rank order of the regions, in terms of achievement, is Midwest, Northeast, Mid-Atlantic, and South and West tied at the bottom. The rank orders, when examined separately for the poor and the non-poor, are essentially the same. As expected, the Midwest and Northeast are at the top of the rankings, and the South is at the bottom. But what is unexpected is that the West should be at the bottom with the South. When the West is examined

Table IV-11

Students' Family Income, Urbanism, and Achievement Level

	Mean Achievement Percentile			N		
Urbanicity	Poor	Non-Poor	Total	Poor	Non-Poor	Total
City over 200,000	27	44	38	802,000	1,409,000	2,211,000
Suburbs	35	61	59	144,000	1,879,000	2,023,000
City from 50,000 to 200,000	33	55	53	254,000	1,675,000	1,929,000
City Under 50,000	37	55	52	675,000	3,924,000	4,599,000
Rural	37	55	52	668,000	3,577,000	4,245,000

Source: Report 2, Table IV-9.

Table IV-12

Students' Family Income, Geographic Region, and Achievement Level

	Mean Achievement Percentile			N		
Geographic Region	Poor	Non-Poor	Total	Poor	Non-Poor	Total
Northeast	36	58	54	474,000	2,414,000	2,888,000
Mid-Atlantic	34	55	52	195,000	1,618,000	1,813,000
South	31	49	45	1,013,000	3,117,000	4,130,000
Midwest	40	60	58	497,000	3,533,000	4,030,000
West	30	48	45	407,000	1,939,000	2,346,000

Source: Report 2, Table IV-8.

in more detail it turns out that Pacific Northwest children have scores which are slightly higher than those for the Midwest, but the scores for the Pacific Southwest are lower than for any other sub-region of the country. This is presumably due to the fact that there are many Hispanics in the Pacific Southwest and, as we have previously seen, their scores are among the lowest of any group. This finding should be interpreted cautiously because of possible sampling errors for sub-regions, and because of problems that many Hispanic children may have had with an achievement test where the test items were in English (but it should be noted that the instruction in the schools was also in English). Nevertheless, there are large regional differences and the need for CE is reflected in these regional differences in achievement.

Finally, it should be noted that there are sex differences associated with CE selection. It has long been known that at the elementary level girls score higher on achievement tests than boys. Table IV-13 demonstrates this fact. It will be seen that for both poor and non-poor children the mean test score for girls is somewhat higher than for boys. There are thus more boys receiving CE than there are girls. This should not be attributed to sex discrimination, but rather to the fact that, in terms of a uniform standard of achievement, boys need CE more than girls do.

Table IV-13

Students' Family Income, Sex, and Achievement Level

	Mean Achievement Percentile			N		
Sex	Poor	Non-Poor	Total	Poor	Non-Poor	Total
Boys	31	52	49	1,263,000	6,409,000	7,672,000
Girls	36	57	54	1,253,000	6,098,000	7,351,000

Source: Report 2, Table IV-12.

At the beginning of this chapter we mentioned Congress' requirement that a study be undertaken to determine the number of students receiving Title I services as a function of the poverty level of the families from which they came and also as a function of the levels of achievement. We will now examine the joint effect of poverty and achievement on selection for CE services. Table IV-14 shows the percentage of students selected for CE as a function of the definitions in the law, namely poverty, defined in terms of the Orshansky Index, and achievement defined in terms of low or regular achievement. One can determine from the table that 74 percent of the students do not receive any CE, 16 percent receive Title I, and 10 percent receive Other CE. Of the students who are both poor and low achievers, 47 percent do not receive any CE while 53 percent do. Of those who are non-poor but low achievers, 58 percent do not receive CE while 42 percent do. Similarly, among those who are poor but regular achievers, 70 percent do not receive CE, while among the non-poor and regular achievers, 83 percent do not receive CE--although 17 percent do. Ideally there would be no students in the low-achieving group who were not receiving CE, and there would be few regular-achieving students who are receiving it. But when one considers the difficulty of correctly classifying children (often based on subjective judgments and less than perfectly reliable tests) the numbers shown seem to represent a reasonable performance on the part of the schools in selecting CE students. Given an effective selection system, the easist way of supplying CE services to the large number of educationally needy students who do not receive CE is to increase the funds available.

We have previously noted that the Office of Education regulations for Title I indicate that students should be selected from the bottom half of the achievement distribution. Table IV-15 shows how CE selection is related to poverty, as defined by the Orshansky index, and achievement, defined as falling above or below the midpoint of the achievement distribution. Under this relaxed definition many more students are eligible for selection because they fall in the bottom half of the achievement distribution. This table shows that 53 percent of the students who are poor and in the bottom half in achievement do

Table IV-14

Students' Family Income, Achievement and CE Selection (Grades 2-6)

	Title I/Title I and Other CE	Other CE Only	No CE
		Percent Selected	
Poor - Low Achiever	40%	14%	47%
Non-Poor - Low Achiever	26	16	58
Poor - Regular Achiever	22	8	70
Non-Poor - Regular Achiever	8	9	83
		Number Selected	
Poor - Low Achiever	573,000	196,000	671,000
Non-Poor - Low Achiever	606,000	376,000	1,358,000
Poor - Regular Achiever	442,000	164,000	1,391,000
Non-Poor - Regular Achiever	851,000	900,000	8,821,000
Total	2,472,000	1,636,000	12,241,000

Source: Derived from Report 2, Figure VI-1.

Table IV-15

Students' Family Income, Achievement and CE Selection with Different Selection Criteria*

	Title I/Title I and Other CE	Other CE Only	No CE
	Percent Selected		
Poor and bottom half in achievement	37%	10%	53%
Non-Poor and bottom half in achievement	20	13	67
Poor and top half in achievement	9	7	84
Non-Poor and top half in achievement	4	7	89
	Number Selected		
Poor and bottom half in achievement	916,000	244,000	1,292,000
Non-Poor and bottom half in achievement	1,111,000	736,000	3,679,000
Poor and top half in achievement	82,000	65,000	752,000
Non-Poor and top half in achievement	278,000	540,000	6,605,000
Total**	2,387,000	1,585,000	12,328,000

*Table IV-14 shows the percent selected for CE in terms of the criteria selected by Congress for the Participation Study. This table retains the same definition of poverty but divides the students in half on the achievement criterion.

**These totals differ from those in Table IV-14 because of rounding errors.

Source: Derived from Report 2, Figure VI-4.

not receive CE, while 67 percent of the non-poor and low achievers do not receive CE. On the other hand 16 percent of the poor and in the upper half in achievement do receive CE and 11 percent of the non-poor and high-achieving students receive CE. In Report 2, other definitions of eligibility are considered. The number of students who do or do not receive CE services varies considerably as various definitions are adopted. Thus, a judgment about how well students are selected and how many are served by CE programs depends largely on how poverty and achievement are defined.

THE EFFECT OF DIFFERENT MEASURES OF ACHIEVEMENT

The analysis of the number of children receiving CE as a function of achievement level has been based on combined reading and math measures. That is to say that a student's CE status was defined in terms of whether or not the student was receiving reading and/or math CE services, with achievement level being determined by the score on a combined reading and math achievement scale. While the law requiring the Participation Study spoke of Title I as an overall program rather than in terms of reading services or math services separately, it seemed desirable to see if the classification of students would be changed if the classification were based on a reading test, a math test, or the two combined. It has also been argued that the results might have been different if the analysis had been done separately, if the students receiving reading CE had been classified on a reading test and the students receiving math CE had been classified on the math test results, rather than on results from combining the reading and math tests.

The reason the original analyses were done on the basis of the combined scores was the belief that the separate analyses would give essentially the same results as those based on combined test scores and that the law did not make any distinction. This belief was based on the fact that there was a high correlation between the combined score and either the math or the reading test separately. Table I-16 of Report 9 shows that these correlations range from a low of .82 to a high of .96. However, interest continued as to the nature of the results if the analyses had been done using separate test scores. We therefore made a special analysis for this report. Table IV-16 shows the percentage of students receiving various CE services when classified in terms of a reading test, a math test, and both tests combined. Here the students are classified as CE students if they are receiving reading CE only, math CE only, or both. Table IV-17 shows similar results except that the students are classified in terms of achievement test quartiles rather than in terms of grade equivalents. It will be seen that the results are very similar irrespective of how the classification is done. Thus, we conclude that the results reported in Reports 2 and 3 are invariant to the particular achievement classification scheme used.

As indicated above, it was also suggested that the classification of students should have been done separately for reading or math CE services and the appropriate reading or math tests should have been used to make the classifications. Again special analyses were done for this report and the results are shown in Tables IV-18 and IV-19. The tables show that the percentage of students classified in the various achievement levels by type of CE service are almost identical whether classified in terms of the reading test for reading CE or the math test for math CE or in terms of both tests combined. Of course the tables also show that there are only about one half as many students classified as receiving math CE as there are receiving reading CE. The results reported here are almost identical to those previously reported in Table 2-2 of Report 3.

Our overall conclusion is that it makes little difference whether the achievement scores used to classify students on achievement are reading scores alone, math scores alone, or both combined. The proportion of students designated as receiving various CE services in terms of levels of achievement is essentially the same irrespective of the particular achievement measure used.

Table IV-16

Percentage of Students Receiving Reading and/or Math CE Services by Achievement Level Based on Reading, Math, or Combined Achievement Tests

Achievement Level	CE Selection Status												Total
	Title I or Title I and Other CE			Other CE Only			No CE at a CE School			No CE at Non-CE School			
	Reading %	Math %	Both %	Reading %	Math %	Both %	Reading %	Math %	Both %	Reading %	Math %	Both %	
Low Achievers	31			16			42			10			99%
		28			17			45			11		101%
			31			15			42			12	100%
Regular Achievers	9			9			69			11			98%
		12			10			67			12		101%
			10			9			66			15	100%

Source: Special tabulation for this report.

Table IV-17

Percentage of Students Receiving Reading and/or Math CE Services by Quartiles on Reading, Math, or Combined Achievement Tests

Achievement Level	CE Selection Status												Total
	Title I or Title I and Other CE			Other CE Only			No CE at a CE School			No CE at Non-CE School			
	Reading %	Math %	Both %	Reading %	Math %	Both %	Reading %	Math %	Both %	Reading %	Math %	Both %	
Bottom Quartile	31			17			42			10			100%
		28			16			46			10		100%
			32			14			42			11	99%
2nd Quartile	19			13			57			10			99%
		20			13			57			11		101%
			19			11			58			12	100%
3rd Quartile	7			9			73			11			100%
		10			9			70			12		101%
			7			8			70			15	100%
Top Quartile	3			6			79			12			100%
		3			8			79			11		101%
			2			6			75			17	100%

Source: Special tabulation for this report.

Table IV-18

Percentages of Students Receiving Reading (or Math) CE Services by Achievement on Reading (or Math) Achievement Tests or Both Tests Combined

Achievement Status	Reading CE Selection Status								Total
	Title I or Title I and Other CE		Other CE Only		No CE at a CE School		No CE at Non-CE School		
	Reading %	Both %	Reading %	Both %	Reading %	Both %	Reading %	Both %	
One Grade Level Below	27	28	17	18	46	44	11	10	100%
Above One Grade Level Below	8	7	8	8	72	73	12	12	100%

Source: Special tabulation for this report.

Achievement Status	Math CE Selection Status								Total
	Title I or Title I and Other CE		Other CE Only		No CE at a CE School		No CE at a Non-CE School		
	Math %	Both %	Math %	Both %	Math %	Both %	Math %	Both %	
One Grade Level Below	15	18	13	14	61	58	11	10	100%
Above One Grade Level Below	5	4	8	7	75	77	12	12	100%

Source: Special tabulation for this report.

Table IV-19

Percentage of Students Receiving Reading (or Math) CE Services by Quartiles on Reading (or Math) Achievement Tests or Both Tests Combined

Achievement Status	Reading CE Selection Status								Total
	Title I or Title I and Other CE		Other CE Only		No CE at a CE School		No CE at a Non-CE School		
	Reading %	Both %	Reading %	Both %	Reading %	Both %	Reading %	Both %	
Bottom Quartile	27	28	17	17	46	45	10	10	100%
2nd Quartile	17	16	12	13	61	60	10	11	100%
3rd Quartile	5	6	8	8	75	75	11	11	100%
Top Quartile	2	2	5	5	81	81	12	12	100%

Achievement Status	Math CE Selection Status								Total
	Title I or Title I and Other CE		Other CE Only		No CE at a CE School		No CE at a Non-CE School		
	Math %	Both %	Math %	Both %	Math %	Both %	Math %	Both %	
Bottom Quartile	14	16	13	13	62	61	10	10	100%
2nd Quartile	9	9	10	10	69	70	11	11	100%
3rd Quartile	4	4	8	8	76	77	12	11	100%
Top Quartile	2	1	7	6	81	81	11	12	100%

Source: Special tabulation for this report.

HOW ARE STUDENTS SELECTED FOR CE?

The selection of schools to receive CE resources and the selection of students for CE services are complex processes and vary considerably from district to district and from school to school. SES Report 5 explores this problem in some detail. It concludes that in selecting schools for CE resources, districts use a number of criteria and that "the most frequently used criteria, either alone or in combination are: free or reduced-price lunch counts alone (22 percent), AFDC enrollment alone (15 percent) and free or reduced-price lunch counts combined with AFDC enrollment (14 percent). The remaining 49 percent of the districts reported using other combinations of criteria with no single combination being used by more than 6 percent of the districts." Once a school receives CE resources it has the problem of how to determine which students actually are selected to receive these resources. Again, we find a number of different methods being used. When school principals were asked to indicate how CE students were selected they indicated the methods shown in Table IV-20.

Test results and teachers' recommendations are the two most frequently used methods. Membership in targeted groups or parents' requests are used less frequently.

Earlier we saw the relationship between poverty and achievement level and student selection for CE services. We concluded that generally the schools were doing a reasonable job in selecting the educationally needy students for receipt of CE services. Note that we resort to statements such as "generally" to describe the success in selecting CE students. It would be desirable to have a numerical index to describe the relationship between need and selection--a Targeting Index. If there were such an index it would allow comparisons of actual performances against some numerical standard. It would make it possible to compare the success of selection practice between schools, districts, or other categories of interest. In SES Report 13 a study is reported that

Table IV-20

Criteria Used by Title I Schools for Selection of CE Participants, and Selection Rates for 'Needy' and 'Non-Needy' Students*

School Selection Criteria	Percentage of 'Needy' Students Selected	Percentage of 'Non-Needy' Students Selected
Test results alone	51	7
Test results and teacher recommendation	49	4
Some combination of test results, teacher recommendation, volunteer, and/or parent request	47	3
Teacher recommendation alone or combined with parent request and/or volunteer	49	5
Membership in one or more target groups only, or in combination with test results	59	10
Target groups, test results, and teacher recommendation	43	7
Some combination of target groups, test results, teacher recommendation, volunteer, and parent request	40	3
All students in the school participate**	(29)	(3)

*'Needy' and 'Non-Needy' students are defined in terms of teacher's judgment of student's need for CE services.

**Some principals reported that all students in their school participate in CE programs. However, the records of the Compensatory Education Roster do not indicate that all students in these schools are selected for Title I services.

Source: Report 5, Table 8-3.

investigates the appropriateness of a number of proposed targeting indexes. Twenty-five different indexes were examined based on different assumptions about what such an index should measure. Here we will examine only two of the possible indexes. The interested reader will want to turn to the full report.

All of the indexes are based on the idea that within a school, students should be selected for CE based on educational need. In exploring the indexes, the levels of achievement on the CTBS are taken as indicators of educational need. The first index uses the simple idea that the index should be based on the proportion of students selected for CE who fall below some cut-off point in achievement level. Thus, a school with all of its CE students below, say, the 50th percentile, and none of them above it, is presumably doing a better job of selection than a school where only half of the CE students are below the 50th percentile and half of them are above that level. Table IV-21 shows the actual distribution of schools in our sample when the cut-off point is in the 50th percentile. The 50th percentile is based on the idea that Title I regulations suggest that Title I students should be selected from those in the lower half of the academic achievement distribution. The 35th percentile was chosen because when teachers are asked which students they think are in need of CE services they tend to select students who fall below the 35th percentile. The table should be read as follows: for the 50 percentile cut-off it shows that if a school had 100 students receiving CE reading services then there were 2 percent of the schools where 60 of the students were below the 50th percentile and 40 students were above the 50th percentile. Similarly there were 11 percent of the schools where out of 100 students, 68 were below the 50th percentile and 32 were above it. At the mid-point in the distribution of schools, the typical school selected reading students in such a manner that 88 percent of the students selected for CE were in the bottom half on achievement, and 12 percent in the top half. For math the split is 84 percent in the bottom half and 16 percent in the top half. If the cut-off

Table IV-21

Percentage of Schools Having CE Selectees Who Score Above and Below the 50th and 35th Percentile

Percentage of Students Selected for CE:		Reading	Math
Below 50th Percentile	Above 50th Percentile	% of 206 Schools	% of 161 Schools
36	64	0	2
44	56	1	3
52	48	2	4
60	40	2	5
68	32	11	11
76	24	12	13
84	16	24	24
92	8	33	19
100	0	15	19
Below 35th Percentile	Above 65th Percentile		
12	88	0	1
20	80	0	4
28	72	2	2
36	64	5	4
44	56	6	7
52	48	12	8
60	40	13	16
68	32	17	18
76	24	21	15
84	16	17	10
92	8	6	6
100	0	1	9

Source: Report 13, Table 7-1.

is changed to the 35th percentile then for the median school the split is 70 percent of the students below the 35th percentile in reading and 30 percent above it. For math the split for the median school is 62 percent below the 35th percentile and 38 percent above it. It will be noticed that schools do a better job of selecting educationally needy students for reading CE than they do for math CE. It will also be seen that the apparent success of schools in selecting students to receive CE varies depending on the cut-off level used; the schools give the appearance of doing a better job if the criterion is the 50th percentile. This fluctuation in the implications of the index is probably not serious if comparisons are made between schools or districts, but the fluctuation is not desirable if an absolute standard is needed. The most serious problem with this index is that it considers only the characteristics of the students who are selected for CE and does not consider the characteristics of students not selected. A school with almost all of its students needing CE would look very good on the index irrespective of whom they selected, since almost all of the students selected would be below the cut-off point and there would be few students mis-selected. On the other hand a school with a smaller proportion of needy students might try to do a very careful job of selection but would make some classification errors and would look relatively poor on the index. A good index should consider the characteristics of both students who are selected and those who are not selected.

An index to address that problem can be based on the phi coefficient. A phi coefficient provides a measure of the degree of relationship in a four-celled table. One could make up a table showing the number selected for CE, the number not selected, and whether or not each student scored above or below some defined achievement score. Such a table would look like the one below.

	Achievement Scores	
	Above 35th Percentile	Below 35th Percentile
Selected	0	35
Not Selected	65	0

Adjusted phi = 1.0

The closer the relationship between selection for CE and scoring below the achievement criterion, the higher the phi coefficient. Also, when the coefficient is corrected for the marginal splits, it will usually vary from -1.00 to +1.00, thus giving an absolute standard. Table IV-22 shows the adjusted phi coefficients for our schools for reading and math. It will be seen that a few schools do worse than would be expected by random selection, but most of them do better and a few are very good in the quality of their selection. The median coefficient for reading is .53 and for math it is .48. It seems that for most purposes this Targeting Index is preferable to that based only on the characteristics of the students selected, although it requires more complex calculations.

Other indexes can be developed. For example, instead of dichotomizing the achievement scores as above or below a certain cut-off, one could use the achievement scores as percentiles or as percentile ranks and compute a point-biserial correlation. This has the advantage of using more of the achievement information than does the phi coefficient. In Report 13 still other methods are considered, each with its advantages and disadvantages. The index to be preferred depends on the use to be made of it and on the ability to do complex calculations. The discussion in Report 13 includes a table that answers a number of questions for each index. The questions considered are:

Table IV-22

Percentage of Schools By Adjusted Phi Coefficients, Showing Relationship Between CE Selection and Achievement Scores Dichotomized at the 35th Percenti

Adjusted Phi Coefficient	Reading % of Schools	Math % of Schools
Less than -.22	0	1
-.22 to -.13	0	2
-.12 to -.03	1	1
-.02 to .02	0	3
.03 to .12	0	3
.13 to .22	6	7
.23 to .32	8	15
.33 to .42	12	9
.43 to .52	22	17
.53 to .62	21	14
.63 to .72	12	6
.73 to .82	11	7
.83 to .92	6	4
.92 and above	1	11

Source: Report 13, Table 7-10.

Is the index easy to calculate?
Does the index consider the actual receipt of services?
Does the index consider only CE students?
Is the index based on national or school 'norms'?
Does the index consider all the needy students?
Are the schools penalized if they provide CE services to all students?
Are the schools penalized if they target CE to selected grades only?
Does the index have a known sampling distribution?

At first blush the development of a targeting index would seem like a single task but, when seriously considered, it is quite complex. The discussion in Report 13 should be helpful to anyone trying to develop a targeting index.

CHAPTER V. HOW EFFECTIVE IS COMPENSATORY EDUCATION?

Summary

This chapter is concerned with the amount of achievement growth resulting from Title I services. First, a hypothetical example is given to illustrate the problems involved in forming proper comparison groups, and also to show the way students change in CE status from year to year. The example will aid in understanding the major results. The results are presented by comparing the rate of growth of Title I students with the rate of growth of Regular Needy students and Regular students. The results from the first year of the study show:

- *In reading, in grades 1, 2, and 3, Title I students grow at a faster rate than similar Regular Needy students. In grades 4, 5, and 6, the Title I students grow at the same rate as Regular Needy students.*
- *In math, for all grades from 1 through 6, Title I students grow at a faster rate than similar Regular Needy students.*
- *Title I students usually grow at a rate that is similar to the rate of growth of Regular students. Nevertheless, the gap between Title I students and Regular students widens as grade increases. It is shown that this increasing achievement gap is to a considerable extent artifactual.*

The results of the three-year longitudinal study confirm the results for the first year. A number of different analyses show that the less disadvantaged Title I students benefit from a year of Title I services and are promoted out. However, the most disadvantaged students usually received Title I services during all three years of the study and did not show relative gains, but they did not drop further behind, perhaps because of Title I.

School, principal, and teacher characteristics (as well as instructional practices) associated with achievement growth were examined. It was found that:

- *Greater experience in teaching is related to higher student growth in both reading and math.*
- *The amount of regular instruction and tutor/independent work shows some positive, but modest, effects on achievement growth. In contrast, the amount of instruction by special teachers or instruction in very small groups does not often contribute to the explanation of achievement growth, and when these do negative relationships are observed.*
- *In both reading and math, the disruption of instruction tends to be an unfavorable condition for learning in the upper grades but not in the earlier grades.*
- *Frequency of feedback on student progress sometimes relates positively to reading and math achievement growth.*
- *In reading only, a teacher's effort in planning and evaluation shows a positive relationship to achievement growth in some grades.*

School principals expressed a very positive attitude toward CE. Teachers expressed both positive and negative attitudes. There was considerable evidence that CE students had a positive attitude toward CE and did not feel stigmatized.

We have now examined the questions of who receives compensatory education and what it is. We will now explore the evidence on the effectiveness of CE. But before we do so we should ask how we will judge CE's effectiveness. What do we expect CE to achieve? Generally, students receiving CE are doing so either because tests show that their levels of achievement are low or because teachers judge that their performances are low, or both, and it is judged they would benefit from CE services. How much do we expect them to benefit? Some would say that if their performances improve at all then the cost of CE is justified. This is an absolute criterion in the sense that we are simply asking for some improvement over the student's previous level of performance. But students will grow in achievement even without CE, so we usually require that CE result in an improvement greater than would have been achieved had the students not had CE. But how do we tell how much the student would have improved without CE? We need some kind of a standard for comparison. With the use of a comparison standard the judgment of improvement has changed from a requirement of absolute change to relative change. What is an appropriate comparison group? Some will say that they would like CE students to improve enough to equal the performance of their peers, presumably meaning the average performance of the non-CE students in the school or class. This is probably an unrealistic expectation: some individual students may make such gains but not the average of all the CE students.

Another comparison group might be composed of students who, in initial performance scores and home background, are similar to the students receiving CE. In this case we ask that those students receiving CE for a period of time show performance scores that are superior to the comparison group of similar students who have not received CE. Many would be encouraged if we could simply show some improvement relative to the comparison group even if it were not large. In theory it would be possible to form such comparison groups and after students have received CE services for a year or two to determine how much the CE students have benefited. In practice this is a very difficult thing to do. It will be worthwhile to understand why this is the case.

The first problem is one of definition. In this chapter and in several that follow we present data on the relative performances of groups of students that we call 'Regular Students,' 'Regular Needy Students,' and 'Title I Students.' By Title I students we mean those students who are reported by their schools to be "designated to receive" Title I services. The amount of services varies from student to student as does the nature of the services, but, as we saw in Chapter III, these students as a group do in fact receive more hours of reading and math instruction in a different context than other students in the same schools. By Regular Needy students we mean students who are not designated to receive CE services but are judged by their teachers to need such services; in other words, they are receiving largely regular instruction even though they have a perceived need for additional services.* By Regular students we mean the remaining students in a school or class who receive regular instruction. It would seem that these groups of students are fairly clearly defined.** The group a student belongs to is fairly well defined at any one period of time, but when one considers the progress of a student through several school years, the student may, from time to time, belong to all three groups. For example, a student might be a regular student in grade 1 and do rather poorly. In grade 2 the student might be judged as in need of CE but not receive any CE services because there are insufficient resources available for this particular student. In grade 3 the student may still be educationally needy, there may be resources available, and the student may become a Title I student. Thus, in three years this student has been a Regular student, a Regular Needy student, and a Title I student. Or consider the student who performs at the 25th percentile on a test at the beginning of the first grade and is designated a Title I student. Because of Title I services this student's performance improves, and in the spring scores at the 35th percentile. Next year in the second grade there are many needy students below the 35th percentile so the student is 'promoted out' of Title I. The student is still somewhat needy but not among the most needy and thus is no longer a Title I student. It is easy to follow the changing classification of individual students, but in an evaluation of the effectiveness of CE we are dealing with thousands of students in each classification and the change of students from one category to another makes the formation of proper comparison groups extremely difficult.

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*It will be remembered from Chapter III that Regular Needy students actually receive more special services than Regular Students but less than Title I students.

**Except for the Regular students. In some comparisons Regular students are all the students in a school except for the CE students. At other times Regular students are the students remaining after the CE students and Regular Needy students are subtracted. The text will make clear which definition is being used. Another group of students, not considered in this chapter, are students receiving other than Title I CE services.

A HYPOTHETICAL EXAMPLE

In this chapter, and in later ones, we will be presenting tables and graphs to show the relative achievement gains of different groups of students. To help in understanding the meaning of these graphs and tables, and to illustrate how they have been derived, we present a hypothetical illustration. In the 'Hypothetical School,' during the first year, there was only a single third grade class consisting of eight students. The left hand side of Table V-1 shows these eight students and their fall percentile scores on an achievement test. Based on these achievement scores the school classified the eight students as follows: Students A, B, C and D were classified as Regular students because they scored above the 50th percentile and were not in need of CE services. Students E and F, who had scores of 35 and 30, were judged by their teacher to be in need of CE but since the school has only enough resources for two Title I students, students E and F were classified as Regular Needy students. Students G and H, who had the lowest achievement scores of 25 and 15, were selected to receive Title I services.

An achievement test was given again in the spring to the grade 3 students and the four Regular students still performed well, with some improving slightly and some performing somewhat less well. But the two Regular Needy students, E and F, performed less well than they did in the fall and now have the lowest scores of the whole class. The Title I students, G and H, profited from their Title I services and registered gains, gains that placed them above E and F, the two Regular Needy students.

Table V-1

Percentile Scores for Students in the Hypothetical School
Grade 3

Student	Classification	Fall Percentile Score	Spring Percentile Score
A	Regular	85	80
B	Regular	75	75
C	Regular	70	75
D	Regular	65	65
E	Regular Needy	35	25
F	Regular Needy	30	20
G	Title I	25	35
H	Title I	15	25
Class Average		50	50
Average for Regular Students		74	74
Average for Regular Needy Students		32	23
Average for Regular and Regular Needy Students		60	57
Average for Title I Students		20	30

All of the students were promoted to the fourth grade and the right hand part of Table V-2 shows the results for the second year. At the beginning of the year the teacher was faced with a difficult decision. The Title I students, G and H, seem to have profited from their Title I services and were no longer the neediest students in the class. But if their services were taken away what would happen to their performances? On the other hand, the two Regular

Table V-2

Percentile Scores for Students in the Hypothetical School
Grades 3 and 4

	Grade 3			Grade 4		
Student	Classification	Fall Percentile Score	Spring Percentile Score	Classification	Fall Percentile Score	Spring Percentile Score
A	Regular	85	80	Regular	80	80
B	Regular	75	75	Regular	75	75
C	Regular	70	75	Regular	75	70
D	Regular	65	65	Regular	65	60
E	Regular Needy	35	25	Title I	25	30
F	Regular Needy	30	20	Title I	20	25
G	Title I	25	35	Regular Needy	35	35
H	Title I	15	25	Regular Needy	25	25
Class Average		50	50		50	50
Average for Regular Students		74	74		74	71
Average for Regular Needy Students		32	23		30	30
Average for Regular and Regular Needy Students		60	57		59	58
Average for Title I Students		20	30		22	27

Needy students, E and F, clearly needed Title I services and were now performing less well than the Title I students. What to do? Facing the realities of limited funds, the two previous year Title I students had their services taken away and in the fourth grade were classified as Regular Needy students. The two formerly Regular Needy students, E and F, now became Title I students. The last column of Table V-1 shows the performance scores at the end of the fourth grade. It will be seen that the Regular students generally maintained their previous positions and the new Title I students improved relative to their previous position. The previous Title I students, G and H, who became Regular Needy students in the fourth grade, maintained their relative position and did not fall back as a result of losing Title I services.

All of this is shown graphically in Figure V-1. Here it is important to note the relative slopes of the lines. During grade 3 all groups of students improved their performances, but the Title I students improved at a considerably faster rate than the Regular Needy students and at a slightly faster rate than the Regular students. During grade 4 all groups continued their improvements, with the new Title I students improving at a faster rate than the now Regular Needy students and at about the same rate as the Regular students. While this example is hypothetical, in fact, Title I students do tend to do somewhat better than a comparison group composed of Regular Needy students. Also, there is considerable change in status from one year to the next. Of those students receiving Title I services during a particular school year, about 40 percent will not receive Title I services the next year, and those who do not receive them because they were 'promoted out' will continue to perform at the now-higher level that causes them to lose Title I services.

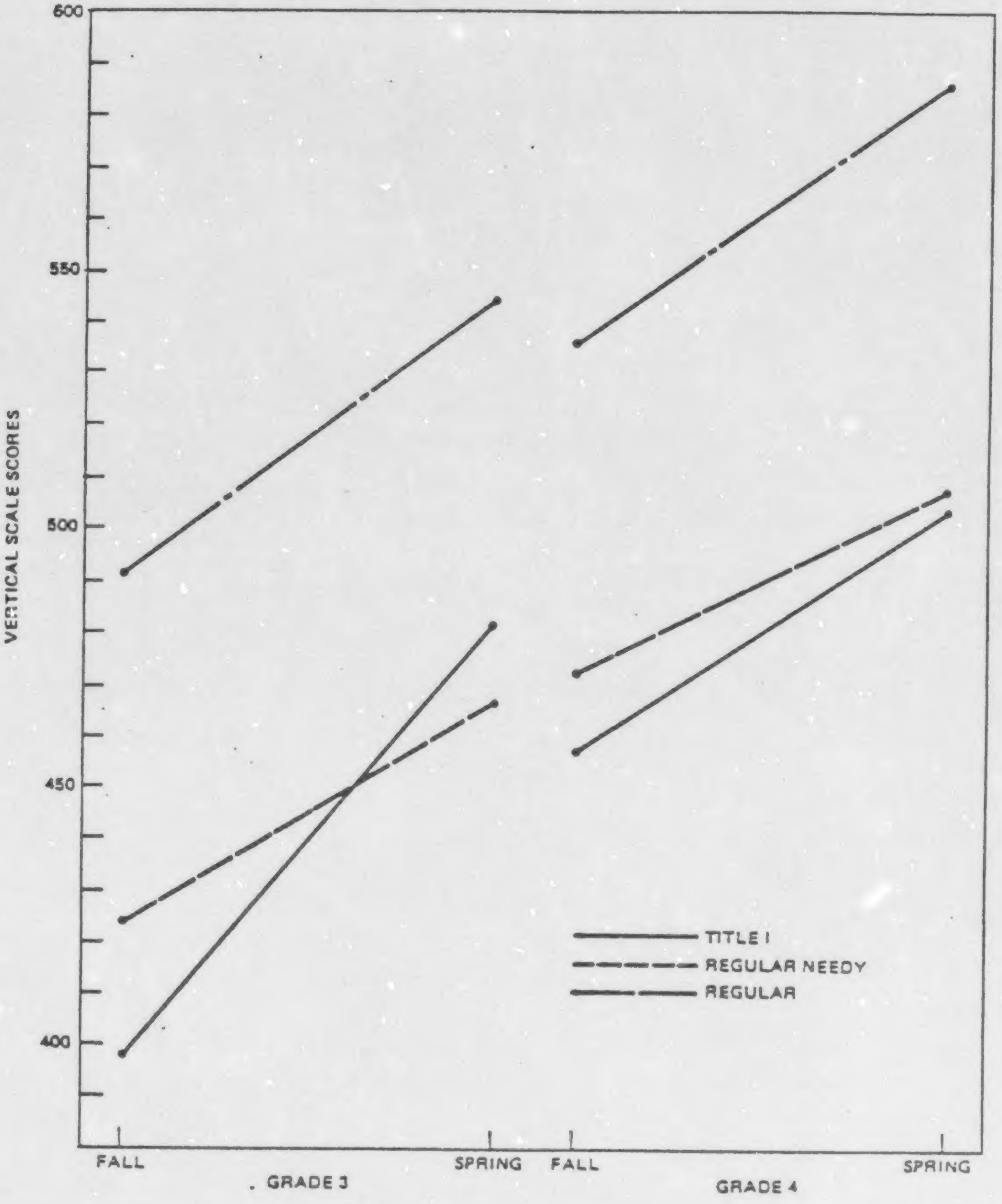

Figure V-1

Gains in Vertical Scale Scores for Example School-
Grades 3 and 4 (Hypothetical Data)

ARE THERE ACHIEVEMENT GAINS FOR TITLE I STUDENTS?

The results reported in this chapter are based on Technical Reports 10 and 12. Report 10 thoroughly examines student growth as measured during the first year of the study, while Report 12 examines student growth longitudinally over all three years. An examination of student performance during the first year has the advantage of being based on the most complete data, since relatively little student attrition took place between the fall and spring testing of the first year. However, there was much greater attrition between the end of school and its beginning the next year for each of the three years. Two different studies of the effects of attrition are presented in Reports 12 and 13. It is generally concluded that while attrition was quite high the results are not jeopardized by it. Nevertheless, Report 10 is based on the sample with the least attrition and thus it was desirable to study the first year sample intensively. Another argument for studying the first year results carefully is that many students receive only one year of CE services and we wished to know what the effects of such one-year services were. Thus, we first present the results from Report 10 and then consider the results based on the three year longitudinal data.

ACHIEVEMENT GROWTH BASED ON FIRST YEAR DATA

The basic results of Report 10 are shown in Figures V-2, V-3, V-4, and V-5. The first two figures show the results for reading, with the first figure showing the results for grades 1, 2, and 3 and the second figure showing the results for grades 4, 5, and 6. We have chosen to use two graphs to show the results in each subject because it makes the presentation less complicated. (We could have shown the results for six different groups of students, but the number of lines crossing and occupying nearly the same space would have confused the picture.) Thus, each graph shows the results for Regular students* (in Title I schools), for Title I students (in these same Title I schools) and for

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*These Regular students include the Regular Needy students.

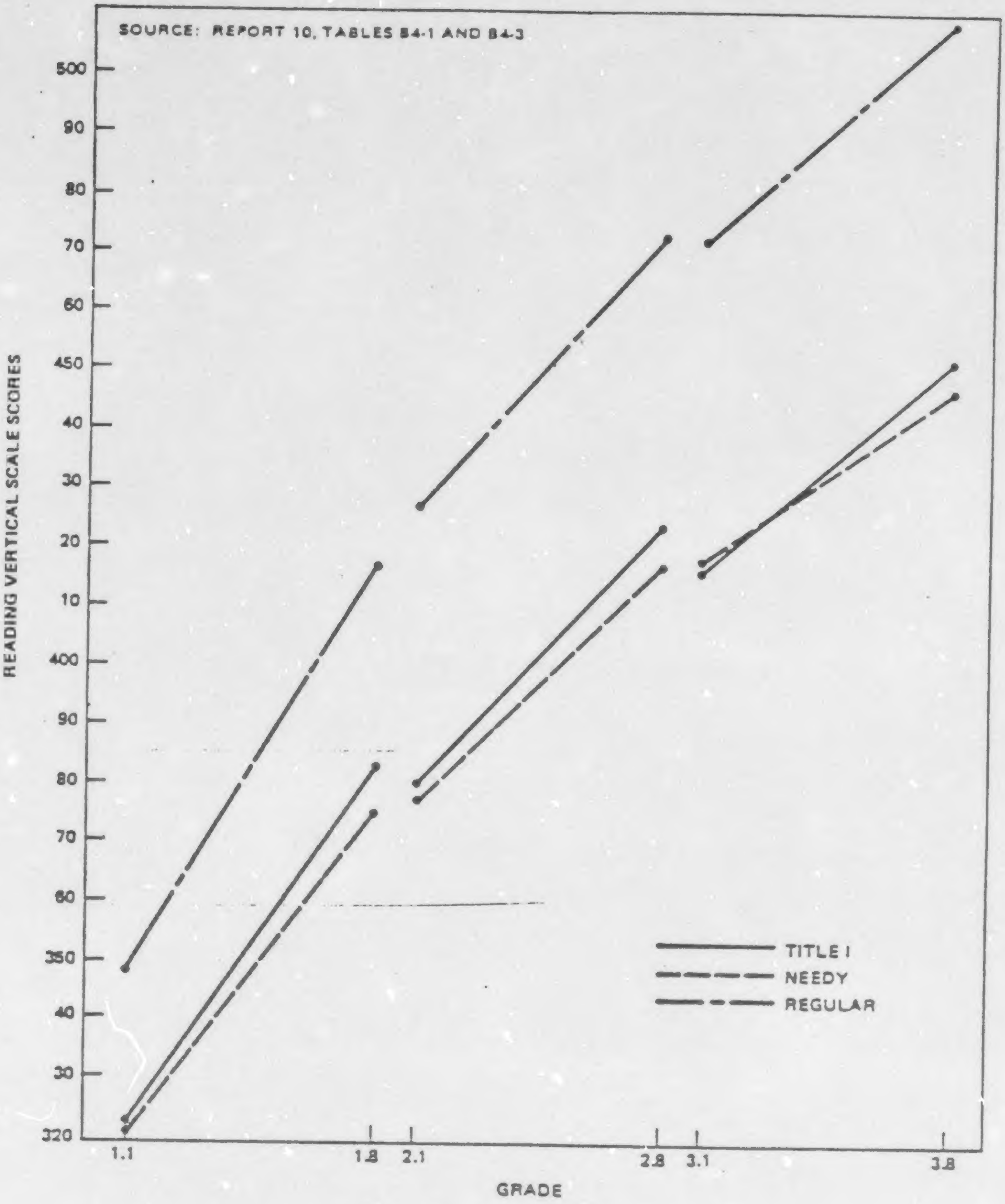

Figure V-2

Reading Vertical Scale Scores for Title I, Regular Needy, and Regular Students in Grades 1, 2 and 3

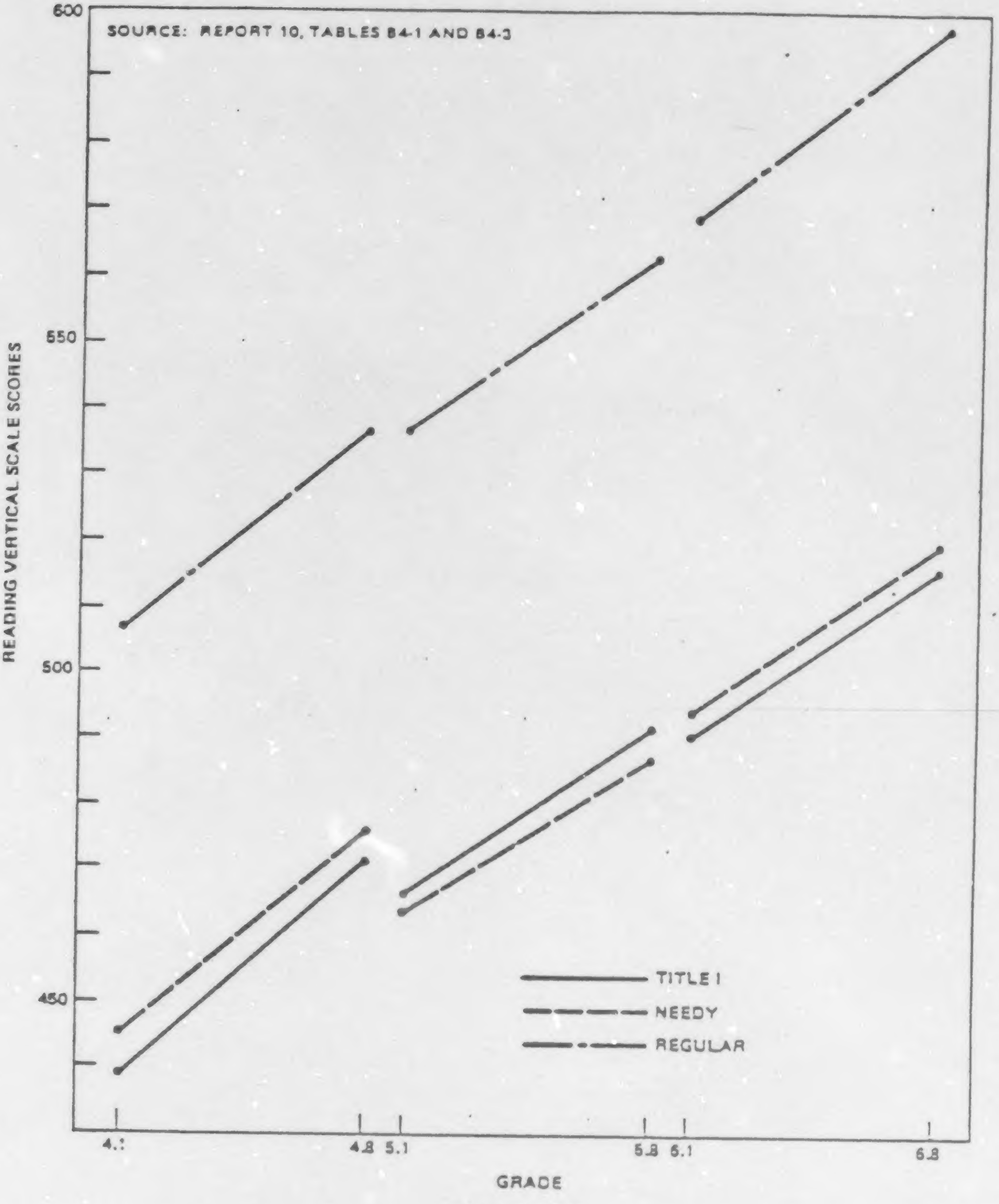

Figure V-3

Reading Vertical Scale Scores for Title I, Regular Needy, and Regular Students in Grades 4, 5, and 6

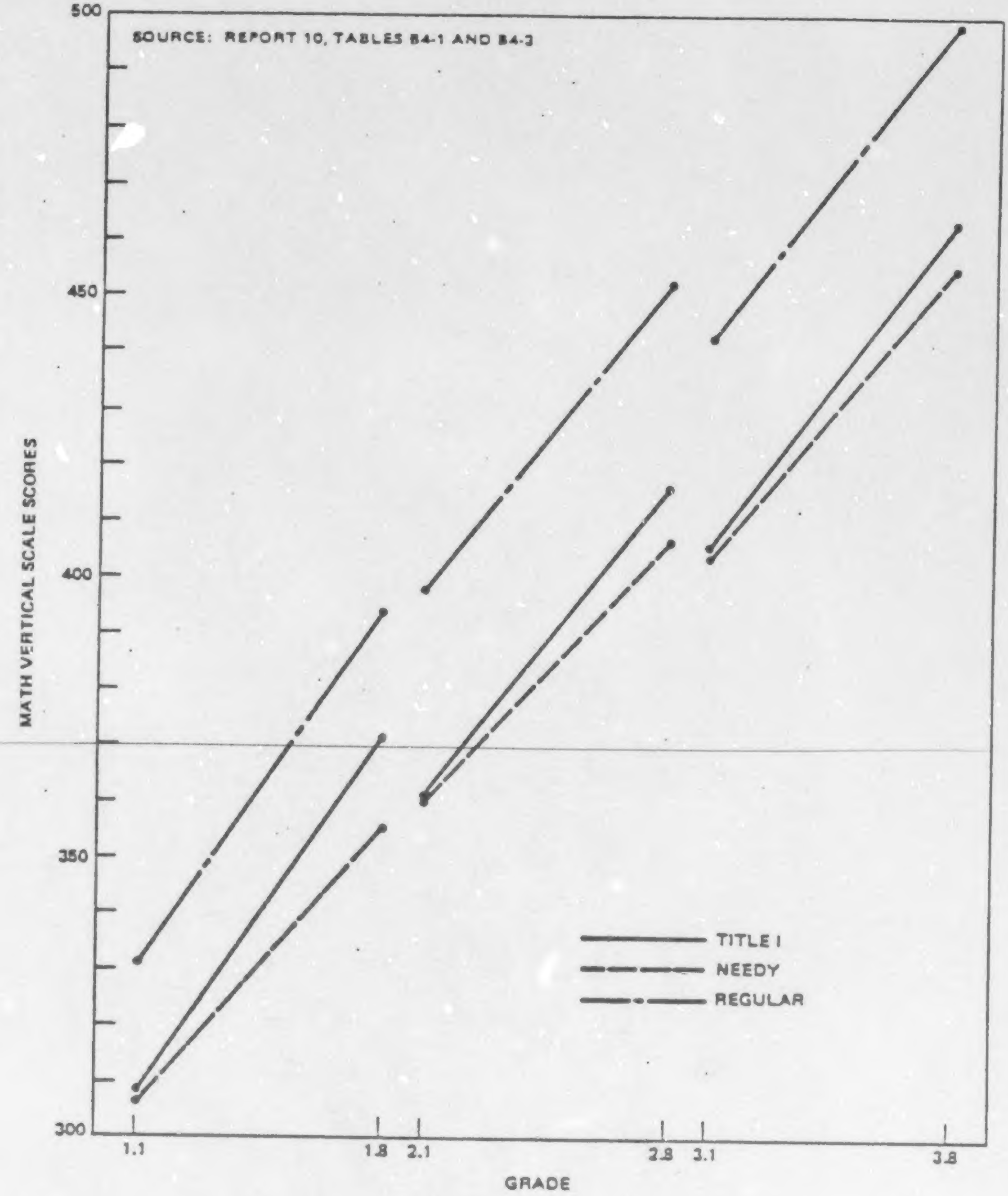

Figure V-4

Math Vertical Scale Scores for Title I, Regular Needy, and Regular Students in Grades 1, 2, and 3

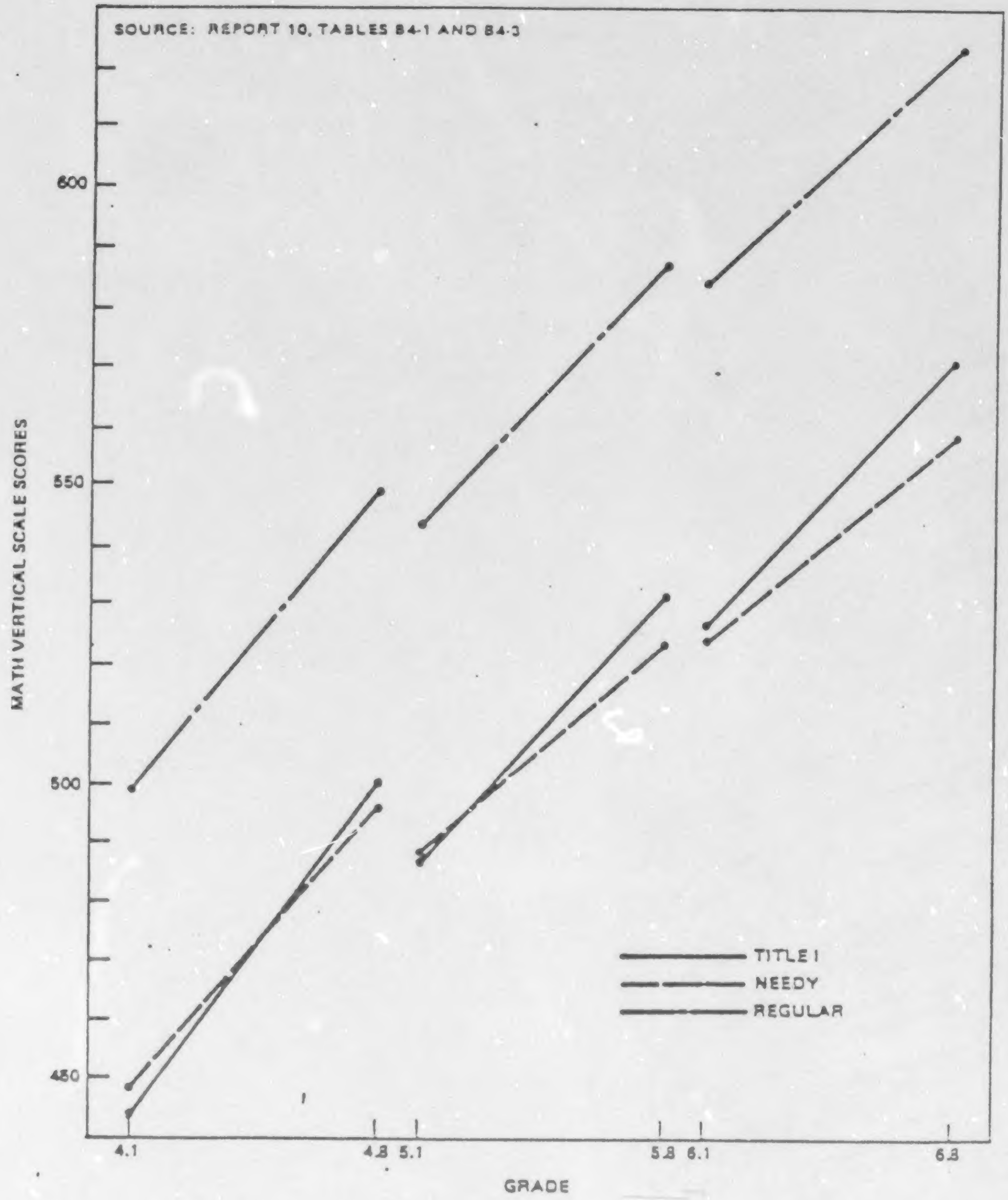

Figure V-5

Math Vertical Scale Scores for Title I, Regular Needy, and Regular Students in Grades 4, 5, and 6

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Regular Needy students in schools not having CE. The choice of this last group as the comparison group is somewhat arbitrary. We could have chosen Regular Needy students in the Title I schools, but there are two drawbacks to using this comparison group. In the first place, these students are needy, but the school authorities have decided that they are not as needy as those chosen for Title I services, and thus they differ from the Title I students. In the second place, there is the problem of the "spillover effect" which might contribute to all students in Title I schools but particularly the Regular Needy Students. This is the problem that the instruction in Title I schools may affect all the students in the school, not just the Title I students. An examination of Report 10 will show that the results for either comparison group lead to the same conclusion.

An inspection of the figures shows the results of the analysis, but such a presentation is not adequate for those who require statistical tests. First, it should be mentioned that the backup numbers for these figures will be found in Table B4-1 and B4-3 of Report 1C. The approximate number of students in each grade for Regular, Title I, and Regular Needy groups in reading are, respectively, 6,400, 2,600, and 600. In math the approximate number of students is 7,500, 1,500 and 1,150. The exact numbers differ from grade to grade. The larger numbers of Regular and Regular Needy students in math is related to the fact that Title I math programs are less common. The main point of the above is to stress that each data point is based on a large number of students and thus is quite stable.

Figure V-2 shows that for reading, the Title I students in grades 1, 2, and 3 grew at a somewhat faster rate than the comparison group of Regular Needy students. All groups of students had educational growth during the school year. In each grade the Regular students started out at higher levels and ended the school year at higher levels. In grades 1 and 2 the Regular students grew at slightly faster rates than either the Title I or the Regular

Needy students. In the third grade the Title I students grew at slightly faster rates than the Regular students. In each of the three grades the Title I students grew at rates higher than those of the comparison group of Regular Needy students. We conclude that in reading for the first three grades students receiving Title I services show improvements greater than would have been the case if they had not received the Title I services. At the same time the amounts of improvement are not great enough to narrow the 'achievement gap' between the Title I students and the Regular students. In fact, the gap is becoming larger.

Figure V-3 shows similar data for reading in grades 4, 5, and 6. For these grades there do not seem to be beneficial effects from Title I services. However, the rates of growth for all three groups appear to be the same. In spite of this apparently equivalent growth rate the gap, between the Regular students and the other students, continues to grow. This growth in the achievement gap is something of an artifact since the composition of the three groups keeps changing from year to year, as it must in a cross-sectional comparison. The better Title I students and better Regular Needy students keep being promoted out of the bottom groups as their achievement scores improve. In any grade, at the beginning of any year (after the first grade), the Regular group is composed of the relatively high achieving Regular students plus the better achieving Title I and Regular Needy students from the previous year. At the same time the Regular group loses its poorest students to the Title I and Regular Needy groups, who have in turn lost their better students and had them replaced by poorer ones. Thus, it is almost inevitable that in cross-sectional data the gap between Regular and Title I or Regular Needy students appears to widen as grade increases. Another contributing factor is that the absolute number of Title I students decreases at the higher grade with the result that the average achievement level of Title I students in the higher grades is lower relative to that in the earlier grades. This is true because the most needy students are being selected and since fewer are selected in the higher grades they are the lowest of the low. In summary, for reading, Title I seems to be somewhat effective in grades 1, 2, and 3, but not effective in grades 4, 5, and 6.

Figures V-4 and V-5 show the results for math. The results here are more positive than they are for reading. They show that for all grades the Title I students improve at a faster rate than the Regular Needy students. Furthermore, the Title I students in math improve at faster rates than the Regular students while the Regular Needy students change at slower rates than the Regular students. It seems quite clear that Title I is effective in math and considerably more so than in reading.

An explanation for this may be the difference in the way reading and math are learned by students. Reading is learned in school but also in a number of other settings. There are opportunities to learn reading at home from many sources, such as comic books, regular books, newspapers, instructions on toys and packages, and also away from home on posters, advertisements, in Sunday School and in other social settings. On the other hand, the opportunity to learn math is much more limited. Outside the school there is some opportunity to learn math in changing money, in sports in keeping score, etc. but such math is quite simple and generally does not increase in complexity with the increasing age of the student. Thus, the school is the main place where math is learned, and it seems apparent that the additional services provided by Title I to math students result in increasing their levels of achievement.

The four figures showing graphs of achievement change give the basic results, but the technical reader will want to refer to Report 10 for the detailed statistical analysis. In describing the methods used in analyzing the data, Ming-Mei Wang, the senior author of Report 10 says:

> "Five types of evaluation models are employed that are related to the models required by the Education Department for use by grantees in evaluating and reporting on their local Title I projects (45 CFR, Parts 116 and 116a). The large SES samples provide us a unique opportunity to apply a variety of methods that require

> different subsets of data to address the same question. Briefly, the norm-referenced analyses are variations of Model A (norm-referenced design). The analyses of variance (ANOVA) with different layouts and different measures of growth, and the analyses of covariance (ANCOVA) using different analysis groups and adjusted for unreliabilities of the covariate (pretest score) are designed to address the cases of Model B (control-group design). The comparison of gains conditional on pretest scores is a deviation of Model C (special regression design). Additionally, the comparisons with expected growth represent a blend of Models B and C where regression-based prediction models are employed to mimic the performance of a control group that is like the treatment group in pretest scores and other relevant characteristics. The analysis of each design further encompasses a class of subanalyses. All the analyses are devised to complement one another so that pitfalls in one may be avoided in another. In the end, we hope that the integrated findings from these different approaches will approximate an accurate evaluation."

The different analyses mentioned above were carried out and are contained in Report 10. They essentially confirm one another and indicate the statistical soundness of the conclusions previously stated, namely that Title I does have a positive effect for reading in the 1st, 2nd, and 3rd grades and in all grades for math.

ACHIEVEMENT GROWTH BASED ON THREE-YEAR LONGITUDINAL DATA

Report 12 presents the results of analyzing the three-year longitudinal data from a number of different points of view. Seven different approaches were used in examining the data. Each one used a somewhat different set of assumptions regarding the appropriate groups for comparison purposes, or the method of handling the initial differences in achievement levels between the groups, or the expected rate of growth between the different groups depending on their initial level of achievement, or the amount and time of participation in Title I. In Report 12 the various statistical tests and descriptions of the assumptions underlying each approach is given in detail. Irrespective of the method of analysis used, there is one common conclusion, namely: participation in Title I has a modest positive effect on achievement growth.

In this report we present the results from three of the analyses which lend themselves to graphic presentation. The statistically minded reader will want to turn to Report 12 for the detailed analyses, but it can be stated generally that most of the differences reported here are statistically significant. Since the number of cases on which the various data points are based is quite large it is fairly easy to get statistically significant differences. The more important question is the practical significance or importance of the differences shown. After the results are shown we will have more to say on this point.

Results for Students Who Participated for Different Lengths of Time. Students participate in Title I for different lengths of time. In this study some students participated for only one year, some for two years, and others for all three years. The reader's first impulse is to assume that the students who participated the longest would show the largest gains. But a little thought will show that this is not the right expectation. As we mentioned in the introduction to this chapter, students enter and leave the Title I program continuously, particularly at the beginning and end of the school year. The better students who have profited the most from the Title I experience are 'promoted out' and students who were not in the program but performed poorly during the previous school year replace them. We will see that the students who stay in the program for three full years are those who start with the lowest achievement and do not gain enough to come to the level of those who are leaving the program. Thus, we must examine the performance of the students at a detailed level which considers their initial performance and subsequent growth.

Figure V-6 shows the relative growth of regular students, students who have participated in Title I for one year only, and students who have participated in Title I during all three years of the study. The results are shown in terms of 'standardized achievement scores' which means that for each testing in each fall and spring for each of the years, a separate standardization was performed so that the mean for the total population of students' tests is 100 and the standard deviation is 20. Thus, the trends in the graph show the relative rates of performance change of the students one to the other.* In examining Figure V-6 it should be noted that the regular students start at a level somewhat higher than the mean and end up the school year at approximately the same position. (This does not mean that the students did not learn during the school year, rather it shows that they retained their same relative standing.) Looking at the students who were in Title I for only the first year of the study we see that they started the year considerably below the regular students and generally a little below the average for all the students. In every case these students improved their relative performance and in four of the eight comparisons ended the school year above the average of all students. This marked gain is true for all four grades and for both math and reading. But we should remember that these students started out at a fairly high level and were the students who could probably profit most from extra instruction. In examining the lines for those students who were in Title I for all three years of the study we see a quite different picture. These students start the school year at a relatively low level of achievement, about one standard deviation below the mean, and do not profit much from their Title I education. In reading there is a slight improvement in relative standing in two of the grades but losses in the other two grades. In math there is some improvement in three of the grades and a loss in one. It can be seen that the amount of gain or loss is fairly small and is never as large as the gain made by the students who participate only one year and are then 'promoted out'. It should be noted that regression effects should be strongest in the lowest achieving groups, yet they are the ones that

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*Actually the standardization was done on the total population of students tested and the graphs do not include the students in compensatory education programs other than Title I, nor those with other combinations of Title I experience. Thus, the sum of the gains and losses for the graphs are not exactly the same, even though they would be for the entire population tested.

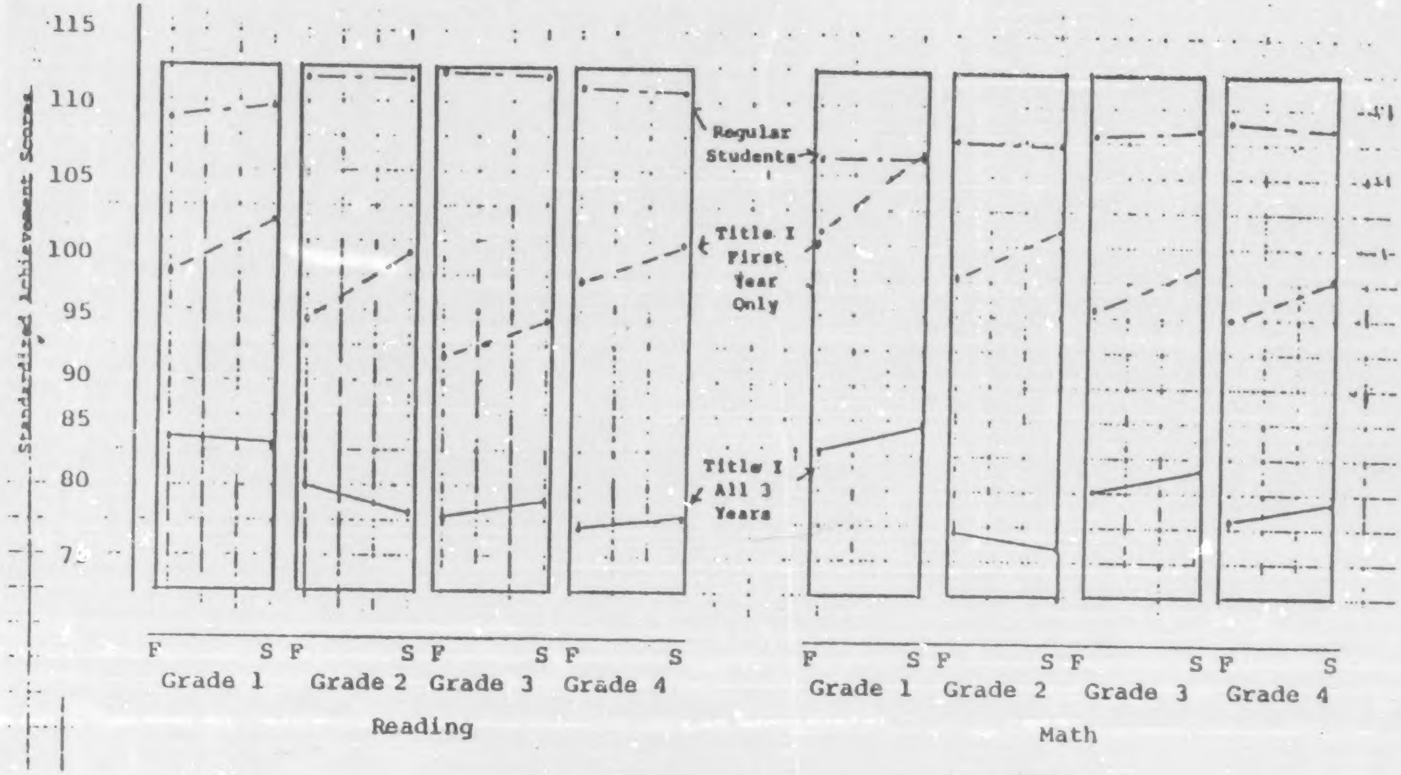

Figure V-6

Standardized Achievement Scores for 1st Year for Regular Students and Title I Students Who Participated Different Lengths of Time

Data from Report 12, Tables A-1 thru A-9.

have the lowest gains and thus the difference between the two groups cannot be attributed to regression. Similarly it can be argued that maturation effects do not account for the differences since the graphs are based on relative change and not absolute growth. From this data it is apparent that those participating in Title I for only one year show a quite positive growth. On the other hand those students who participate in Title I for three years show little growth and it may be inferred that Title I, at its present level of intensity, is not very helpful for them.

Results for Students Who Participated at Different Time Periods or Different Lengths of Time. In this section we will examine the results for students who participated in Title I during the first year of the study only, for those who participated during the second year only, and for those who participated for the third year only. We will also examine the results for those who participated for more than one year but with different periods of participation. Figures V-7 and V-8 show the results for reading and math. Since the results for reading and math are quite similar we will discuss the two figures simultaneously. First we should note that the regular students retain their relative standing thoughout the years of the study. They are well above average of all the students, although the math students are not quite as much above the other students as are those in reading. The next group is those students who were in Title I only during the first year of the study. For both reading and math they make quite large gains, improving their relative position about three and a half points. In reading these students maintain their gain in relative achievement but in math they tend to lose it over the next two years, but they are still above the other Title I students. Next, notice the curves for the students who were in Title I only during the second year of the study. During the first year of the study they tended to lose relative standing and were selected for Title I during the second year. For both reading and math sizable gains were made during the second year while they participated in Title I. During the third year they tended to lose their relative position

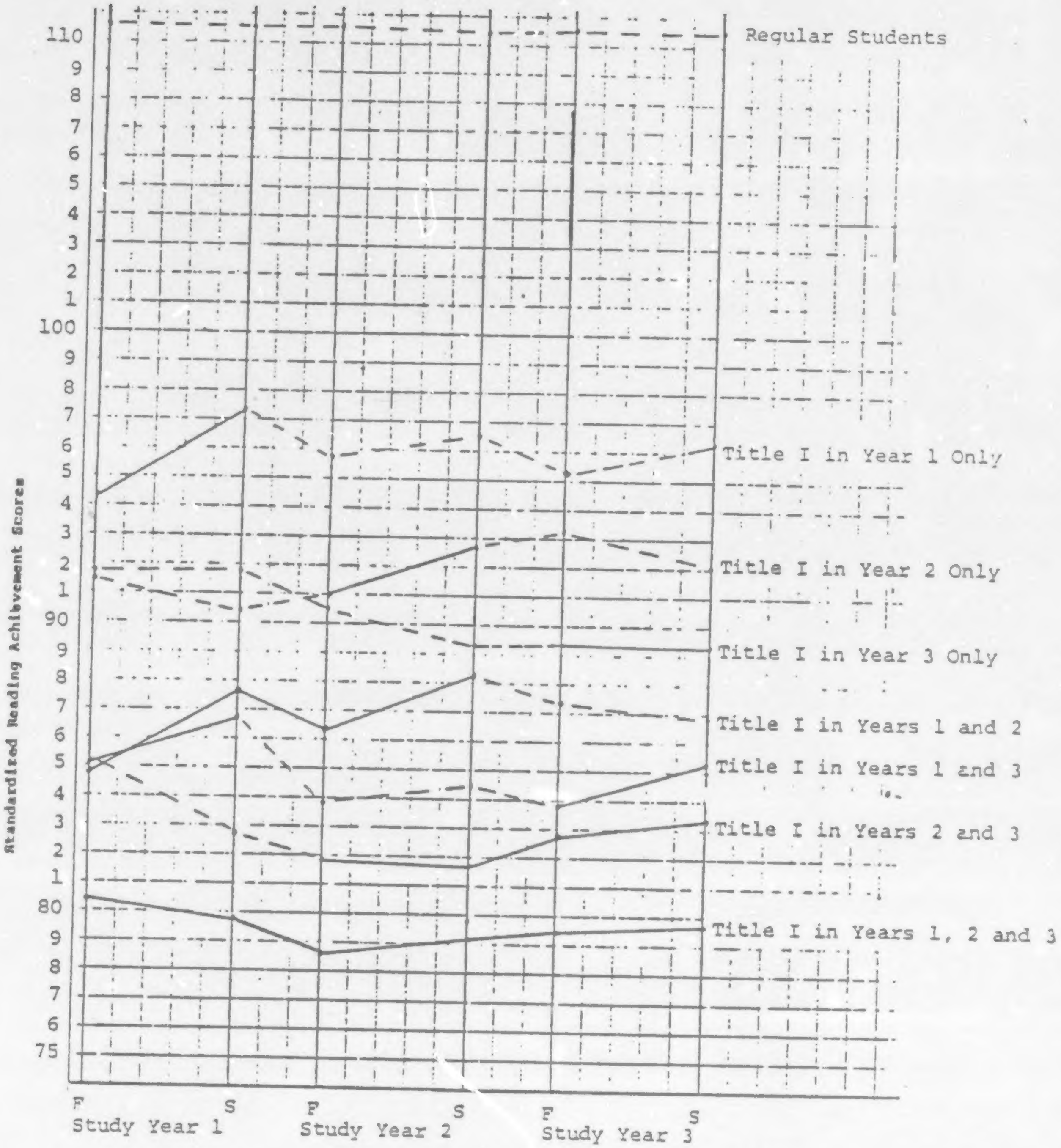

Figure V-7

Patterns for Title I Participation for Reading

Data from Report 12, Table C-1.

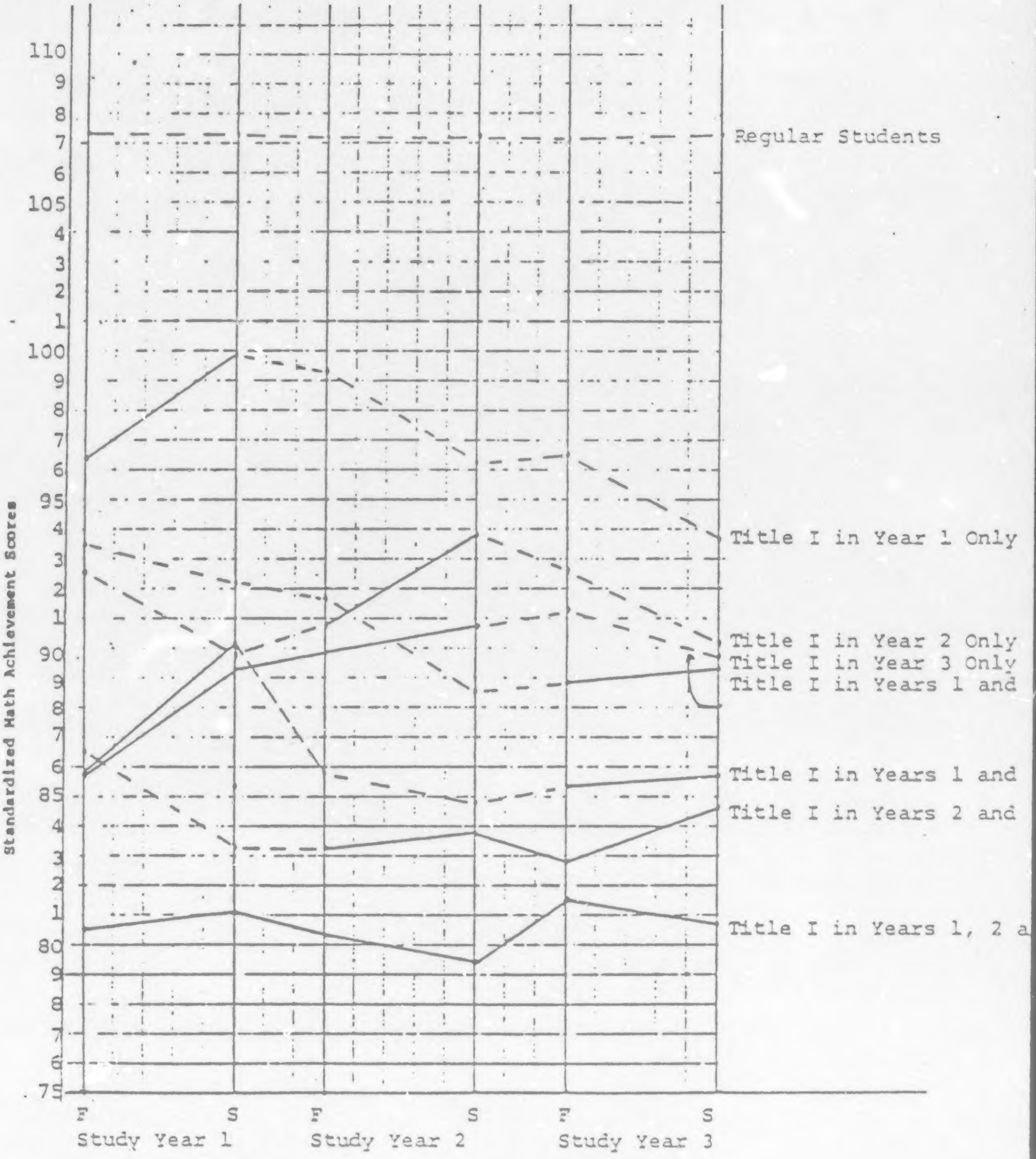

Figure V-8

Patterns for Title I Participation for Math

Data from Report 12, Table C-1.

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when they were not in Title I. Next notice the lines for those who were in Title I only during the third year of the study. They were not selected for Title I during the first or second year of the study and tended to lose in relative standing in each of these years. But finally in the third year they were selected for Title I but show only very modest positive effects of the Title I participation, although their decline of the previous years was halted.

Now, we will examine the performance of those who were in Title I for more than one year. The next curves show the performance of those who were in Title I during the first and second years of the study. It will be seen that in both reading and math, they started the school year at a score of about 85 and gained three or four points. Again during their second year of Title I participation they improved significantly but then in the third year, when they were no longer in Title I, they show a decline. Next consider those students who were in Title I during the first and third year but were not in it during the second year. During the first year they improved at about the same rate as the other first year Title I students we have considered so far, but by the end of the second year they had dropped considerably and were below the standing achieved when they started the first year. Again they were placed in Title I during the third year and show improvement for that year. Next there are those who participated in Title I during the second and third years of the study. At the end of the first year they were quite low, about 82 or 83, and were placed in Title I during the second year, where they stop their decline or make slight improvements. Because they are still quite low, however, they are placed in Title I during the third year, and in both reading and math they show relative gains. Finally there are those students who were in Title I during all three years of the study. After three years of Title I participation they are in the same relatively low position as they were at the beginning of the study.

In reviewing these results the following picture seems to emerge. The regular high scoring students retain their relatively high standing without any compensatory education. Those students who score somewhat lower than regular students but are still not greatly disadvantaged, but are nevertheless selected for Title I during the first year, show marked gains during the first year and are 'promoted out' of Title I, Students who received Title I during the second year, but not during the first year, also show good improvement when they are in Title I. Throughout, we see that students with relatively high standing improve the most during the year(s) they participate in Title I. Those with relatively low standing who do not participate in Title I, tend to lose in relative standing, but when they are assigned to Title I, their loss is arrested and they may show some improvement. Finally the students who start the lowest, remain the lowest even though they participate in Title I. It seems that the better students profit the most from Title I. The poorest students do not gain from participating in Title I but they also do not fall further behind, as might be their fate had they not been in Title I. This can be inferred from the performance of those students who were relatively low during the first year and did not have Title I services.

Comparing Title I Students With Needy Regular Students. In the two previous sections we have studied the effects of Title I by examining the relative growth of students who participated in Title I for various periods of time and had varying amounts of service. In this section we use a different approach by comparing the performance of students who were in Title I with the performance of students who received regular education in their classes but whose teachers said they needed compensatory education. The teachers made this judgment in the first year of the study and we have continued to use that judgment thorughout the study. Figures V-9, V-10, and V-11 show these comparisons. Looking at Figure V-9 we see the results for students who participated in Title I during the first year of the study only. (In the figure a box has been drawn around the lines for the first year.) It will be seen that

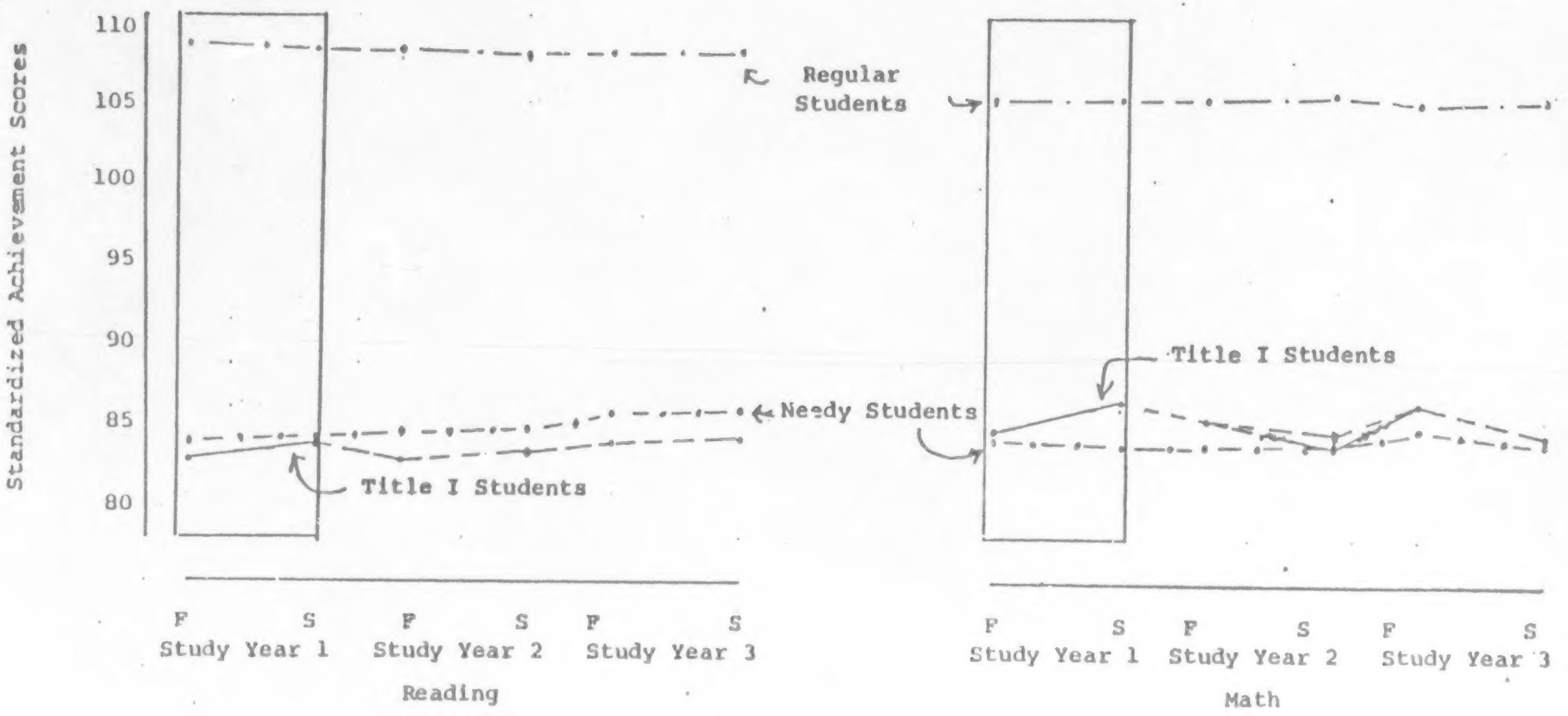

Figure V-9

Title I Participation During First Year of Study

(Data from Report 12, Table D-2).

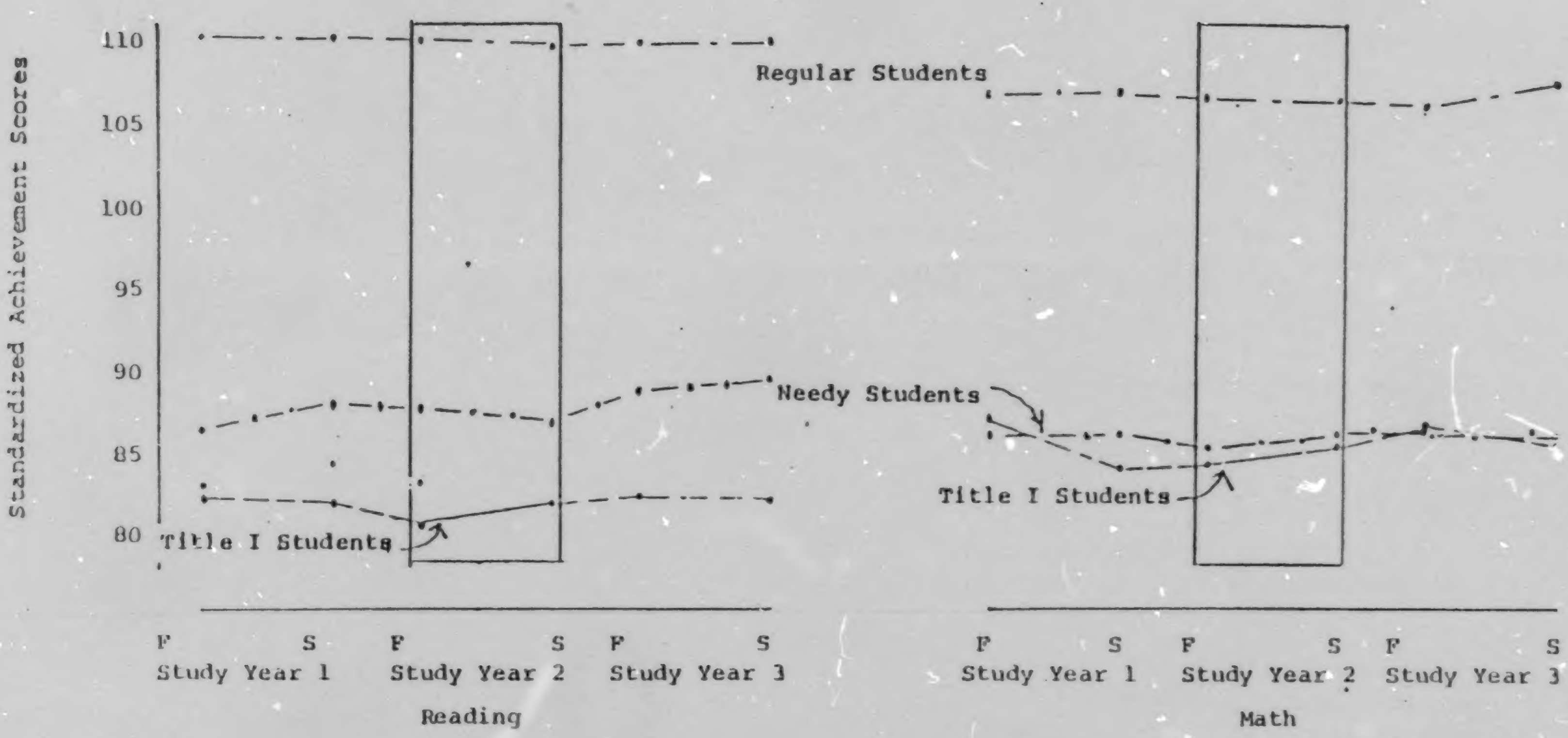

Figure V-10

Title I Participation During Second Year of Study

(Data from Report 12, Table D-1).

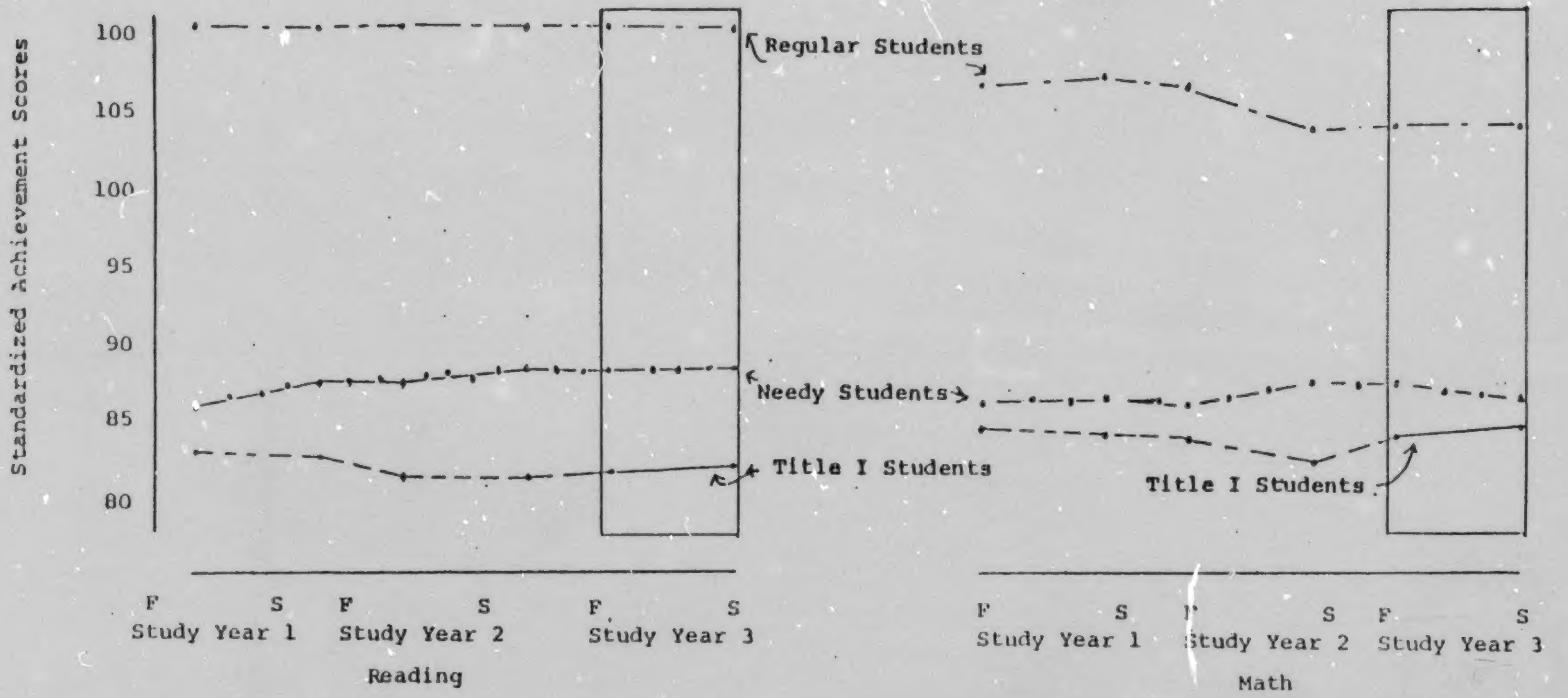

Figure V-11

Title I Participation During Third Year of Study

(Data from Report 12, Table D-3).

the Regular students, in both reading and math, retain their relative standing from the fall to the spring. Well below the Regular students are the Title I students and the Needy students who start the fall of the school year at much the same level. It will be seen that for both reading and math the students who participated in Title I gained relative to both the Needy students and the other Regular students. The gain in math is larger than it is in reading. The figure also shows the relative performance of these same students during the subsequent two years of the study. There is very little difference in the curves for the Title I students and the Needy students in the later years.

Figure V-10 shows the results for students who had Title I services during the second year of the study only. It will be seen that the Title I students in reading improved significantly relative to the Needy students and that they made a small improvement in math. Figure V-11 shows the results for those students who were in Title I only during the third year of the study. Again it will be seen that the Title I students improved relative to the Needy students in both reading and math, although the improvement in math is larger than it is in reading. In all six comparisons shown in these figures, the Title I students show improvement relative to the Needy students, although the improvements tend to be modest.

As previously mentioned, Report 12 contains a number of other analyses that are not presented here because they do not lend themselves to readily understandable graphic or tabular presentation. However, the results are all consistent in showing that Title I participation is associated with increased relative growth. The results are statistically compelling, but to some extent this is because of the large number of cases in the study. The practical importance of the improvement associated with Title I is a matter of educational judgment. Some have argued that compensatory education should bring disadvantaged students up to the level of their peers, presumably meaning up to the average of all the students. This is a very unrealistic expectation.

Students entering school differ widely in achievement both because of their native ability and because of their preschool experience in reading and math. Our results show that Title I, as it is now practiced, can result in an improvement of four or five points on a standardized scale for those students who are initially only modestly disadvantaged. Title I can keep quite disadvantaged students from falling further behind but it does not improve their performance relative to regular students. Some have said that any improvement of disadvantaged students would be worth the cost of Title I. If this is accepted, then Title I has served a useful purpose.

Other Measures of Title I Effectiveness. When this study was started some critics of educational testing argued that standardized achievement tests were an unfair measure of the performance of disadvantaged students. Others argued that while achievement measures might not be effected by compensatory education, the students' attitude toward school and their peers would be improved by compensatory education. With these thoughts in mind we developed a 'functional literacy' test which was thought to measure the students' ability to deal with everyday problems, rather than with simply school-type academic problems. We also adopted a measure of attitude toward school, and toward self as a student. The results from both of these measures are reported in Report 12. Generally there is no relationship between Title I and performance on these measures. While there may be certain problems with standardized achievement tests, they proved to be more sensitive to the effects of Title I than any other measure we used.

TEST--CURRICULUM OVERLAP

As has been mentioned there had been criticism of standard achievement tests as the measure of student learning. In response we developed a measure of 'functional literacy' as an alternate measure of knowledge, but we also investigated the extent to which the material contained in the standardized tests had been taught to the students. In connection with the study of high-poverty schools we asked teachers to examine each of the items in the achievement test given their students and to indicate if 50 percent or more of their students had received at least minimal instruction relevant to each item. We then compiled these results for regular students and for low achieving students (who were defined as falling at or below the 33rd percentile). Table V-3 shows the amount of judged test-curriculum overlap for regular and low achieving students.

Table V-3

Mean Student-Level Percent Overlap for Regular and Low Achieving Students

	Low Achievers	Regular Achievers
Grade 2		
Reading Vocabulary	75	88
Reading Comprehension	69	95
Math Concepts	80	91
Math Computation	65	83
Grade 5		
Reading Vocabulary	73	86
Reading Comprehension	78	93
Math Concepts	75	82
Math Computation	86	91

(Source: Report 18, Table 4-14.)

It will be remembered that in low achieving classes we administered a form of the achievement test that was one step lower than that recommended by the test publisher and this was the test the teachers judged for the low achievers. Nevertheless it will be seen that in each case the teachers judged that the low achievers had a smaller likelihood of having learned the material than had the regular students. There are several points to be made regarding these results. First, the differences between the amount of overlap in the second grade and the fifth grade favor the fifth grade. Second, the amount of overlap reported here is considerably higher than has been reported in other studies (see Cooley (5) and Leinhart, 20). Third, we would expect higher achieving and more able students to have covered more of the material than would the low achieving students, simply because the high achieving students cover more material in the course of their instruction. Finally, gains in achievement were related to the level of material each student was tested on, from one test administration to another. Since there is a very high correlation between achievement scores from test administration to test administration, we can be quite sure that students were taking tests at the same relative level, and thus their gain scores would be comparable. Thus, we believe these results, while interesting, do not in any way invalidate the results previously reported regarding achievement gain.

PRINCIPAL'S AND TEACHER'S ATTITUDES TOWARDS COMPENSATORY EDUCATION

As researchers we place great emphasis on the objective, test-based evidence regarding the effectiveness of CE. At the same time, it is important to consider the attitudes that principals and teachers have toward the program. If their attitudes were negative we might argue that the program was being half-heartedly administered. On the other hand, if the attitudes were positive, it might imply that our results reflect what might be obtained from a well administered program. In the study of high-poverty schools both the principals and teachers were interviewed in depth to determine their feelings about the compensatory programs in their schools. In general, it can be said that the principals had a very positive attitude about the effectiveness of the programs. Table V-4 shows the principals' responses to a question about the effectiveness of their CE program.

Three principals accounted for the lowest two ratings for reading and math. The principal who rated both reading and math programs low in effectiveness had extremely minimal Title I reading and math programs at his school. Thus, it can be seen that at schools where there were significant CE programs the principals rated them from fairly effective to very effective; indeed, they rated them as more effective than the objective facts would justify.

Table V-4

Principals' Ratings of the Effectiveness of Compensatory Programs

		Percent of Responses in:	
		Reading	Math
5	Very effective	27	32
4		40	38
3		29	24
2		4	5
1	Not effective	0	0

(Source: Report 18, Table 5-1.)

The principals were also asked about what effects the CE program might have in areas other than reading and math. In reading, over 90 percent of the principals believed that CE programs had beneficial effects in other areas and in math over two-thirds cited beneficial effects in other areas. Among the beneficial effects cited were: beneficial effects in other academic subjects, improvement in self-concept and self-esteem, improvement in motivation or attitude, multiple teacher exposure, and improvement in logical thinking. Practically no one mentioned sigmatization, but rather the reverse, a pride in being singled out for special attention. The vast majority of the principals felt that the CE programs also had positive effects on the pupils who were not participating since they freed up additional teacher time for regular students.

While principals' attitudes toward CE were quite positive the attitude of teachers was more mixed. A number of teachers noted the dedication of many CE teachers and cited instances where they had put in extra time or spent their own money to buy supplies or gifts for the children. These teachers also noted the additional assistance they received from CE staff members in handling slow learners and in helping in clerical tasks. But a number of teachers cited negative aspects of the program such as disruptions in the class associated with pulling out students and sending them to special rooms

Some teachers also noted concerns about whether they were following program guidelines when they used Title I supplies, instructional materials, or equipment for the entire class rather than just for the CE designated children. There were also a number of administrative problems cited. In general the teacher's negative feelings were associated with administrative problems at the local or school level.

Finally, we attempted to gather some indication of how the students felt about CE programs. We did not talk to students directly about the programs but we examined the observer's reports and found a number of indications of student attitude.

In reading the Classroom Qualitative Summaries only three statements reflecting unfavorably on pullout lab situations were discovered. In one instance--and one of the few instances that hinted at stigmatization--the observer reported that several students expressed resentment at having to come to the CE lab. The immediate stimulus for their comments was the fact that they had been forced to leave the regular classroom while a party was in progress. In the other two cases, students stated to the lab teachers that they were bored with the work assigned.

On the positive side, one observer described a situation in which children requested extra time in the lab for further work on their individual difficulties. Another described the eagerness of the children, and still another related that children applauded and cheered one another for specific achievements in the lab.

Some 13 expressions of positive attitudes toward pullout labs were compiled from school-level daily Topical Summaries for 12 different schools. The following are selected quotes from those protocols.

> "According to the coordinator and some of the Title I teachers, some of the children find the program so enjoyable that they don't want to leave it, and the coordinator said that she overheard conversations where children had stated that they wanted to do poorly on a test because they didn't want to get out of the Title I program.
>
> "Students seemed to enjoy coming to Title I reading and math so much that some of the regular teachers punished their students by not letting them go to Title I classes.
>
> "Kids seem to enjoy themselves in the program. One group was observed to be reluctant to stop class and board buses for home.
>
> "The compensatory education teacher reports that students really enjoy being in the "Special Reading Class." Other students come up to her and ask how to get in."

Also relevant to this topic are the observations of differences in performance and behavior of students in the regular and pullout classrooms. In the Classroom Qualitative Summaries, eight observers in seven different schools remarked that students observed with behavior or performance problems in regular classrooms did not show these same problems in compensatory classes. On the contrary, they were involved and on-task. Looking at the reverse situation, protocols for two regular classrooms included an explicit statement by the observer that the overall behavioral and on-task picture in the classroom improved markedly when the served students left for pullout lab.

WHAT EDUCATIONAL PRACTICES ARE ASSOCIATED WITH TITLE I EFFECTIVENESS?

We have shown that Title I is effective in increasing the performance of low-achieving students. We would like to be able to show that certain educational practices, principal and teacher characteristics, and methods of classroom organization are related to this effectiveness, so that the useful ones could be more widely adopted. Therefore, we explored a number of these variables. We investigated the relationship of the following to increased achievement:

- Instructional services such as the number of hours of instruction and the costs of that instruction. Also, such factors as the amount of instruction received from regular instructors, special instructors, tutors, or through individual instructional materials.

- Student background variables such as economic status, white/minority status, and mother's education.
- The type of school and instructional setting. That is, whether the school was a Title I school, an Other CE school, or a non-CE school. Also, whether the instruction was given in the whole classroom setting, in small groups, or through individual instruction.
- Characteristics of the instructional personnel such as years of teaching experience, amount of college training, amount of in-service training, and attitude toward the school program.
- Characteristics of the educational environment such as the school's minority concentration, school's CE concentration, district's control of instruction, principal's instructional leadership, and amount of classroom disturbances.
- Characteristics of educational practices such as: the amount of effort devoted to planning and evaluation, use of lesson plans, frequency of feedback, amount of homework, individualization of instruction, and use of audiovisual aids.

The effectiveness of these variables was explored by a number of different techniques such as regression analysis and causal modeling. Generally the results were disappointing in the sense that there were no strong relationships between any of these variables and increases in achievement. There were some relationships that seemed to be significant but they were not strong. The most noteworthy findings were:

- Greater experience in teaching is related to increased student growth in both reading and math.

- The amount of regular instruction and tutor/independent work shows some positive, but modest, effects on achievement growth. In contrast, amount of instruction by special teachers or in very small groups does not often contribute to the explanation of achievement growth, and when it does, a negative relationship is observed.
- In both reading and math, disruption of instruction tends to be an unfavorable condition for learning in the upper grades, but no relationship is found in the earlier grades.
- Frequency of feedback on a student's progress sometimes relates positively to reading and math achievement growth.
- In reading, a teacher's effort in planning and evaluation shows a positive relationship to achievement growth in some grades. This relationship was not found for math.

In summarizing this chapter it can be said that there is evidence that Title I services are positively related to achievement growth in reading in the first three grades and that Title I services are positively related to achievement growth in math in all grades. As just discussed there are some educational practices that are positively related to achievement growth. Students who receive instruction from more experienced teachers profit more than those receiving instruction from less experienced teachers. Also, instruction in the regular classroom setting seems to be a positive factor as does receiving instruction in a setting without disruption.

From a practical point of view one implication of these findings is that Title I services should be increased so that they are available to all needy students. Since only about half of all needy students are now receiving Title I services this would require a very large increase in the amount of Title I funding. A political judgment is required as to whether the amount of gain is sufficient to justify this increased funding, but it is clear that many children who could profit from Title I services are not receiving them.

CHAPTER VI. HOW COST-EFFECTIVE IS COMPENSATORY EDUCATION?

Summary

In CE programs it is usually assumed that as the cost of the resources increases, there will be a corresponding increase in the growth of student achievement. This assumption is basic to most federal education programs. To test this assumption, a "resource-cost" model was developed that allowed us to examine the relationship between instructional costs and achievement growth. The results were that:

- *There is no demonstrated relationship between the costs of the instruction students receive and changes in academic achievement.*

It has consequently been argued that this finding can be explained by the fact that the least able students receive the most costly services, and they are also the ones that are least likely to improve academically. This idea was tested and it was found that:

- *The cost of instructional services received by the least able students is higher than the cost of instruction for more able students.*

This second finding offers some explanation for the lack of relation between instructional cost and achievement growth. When coupled with the findings reported in Chapter V, that the least able CE participants profit the least from their services, we understand the nature of the conclusions to the issues of cost-effectiveness. An understanding of the dynamics underlying the conclusions is necessary for policy makers to make rational policy decisions.

INTRODUCTION

It seems reasonable that as more and more resources are made available for the instruction of low-achieving students, the achievement of the students should increase. One of the assumptions underlying federal funding of educational programs is that poor school districts are not able to marshall enough local resources to provide the extra services to help low-achieving students; therefore federal or state funds are needed. We attempted to test the assumption that additional funds would increase performance by investigating the relationship between the amount and costs of resources consumed and consequent changes in student achievement. The finding is that there is no positive relationship between the total cost of the personnel and other resources used in instruction and growth in achievement. Since this finding is contrary to conventional wisdom, as well as the assumption underlying Title I and many other social programs, it deserves to be scrutinized carefully.

THE RESOURCE-COST MODEL

Early studies of cost-effectiveness were usually based on obtaining the total expenditures involved in a CE program and dividing them by the number of participating students. This yields a per-pupil cost, but there are many reasons why this approach gives untrustworthy results. Report 7 discusses these reasons, which include: the assumption, inherent in this method of calculation, that all students in a project receive the same services, the vastly different amounts of money that actually are used for instructional purposes even though the per-pupil expenditures are the same (due to different amounts that are taken 'off-the-top' for such things as administration, building use, capital expenditures, and staff training), and variations in costs for similar services between different regions of the country.

In an attempt to overcome the limitations of the above approach, researchers developed a "resource-cost" model based on the idea of applying a standard cost to each service actually received by students. This bottom-up approach, as contrasted with the top-down approach, starts with a teacher's report of how much instruction each student received. The teacher indicates for each student the amount of reading instruction (or math instruction) received, and the situation or context in which the instruction was given; that is, whether the instruction was given in the whole classroom by the regular teacher, in a small group by a special teacher, in a small group by an aide, or in some other instructional setting. The teacher also reports the instructional materials and equipment used.

Standard prices were developed for each element of instruction given under the various conditions described above. These prices are uniform for all students under similar conditions and thus ignore actual variations in teacher salaries from one region of the country to another. The basic assumption is that a teacher with a certain amount of education and teaching experience is doing as effective a job in one job location as in another. Likewise, it is assumed that similar instructional materials and equipment have the same effectiveness, irrespective of their actual cost. Thus, by using this type of thinking in formulating a resource-cost model, a uniform, common metric was developed and used to cost the instruction received by each student. (This metric did not include administrative costs, building costs, and other overhead time, which, while real, were believed not to have a direct impact on instruction.) The resource-cost model is described in detail in Reports 6 and 7, which also cite relevant literature regarding the model and alternative methods of measuring cost-effectiveness.

THE RELATIONSHIP BETWEEN INSTRUCTIONAL COSTS AND STUDENT ACHIEVEMENT GROWTH

Figure VI-1 shows the relationship between reading program costs and student achievement growth* for Title I students, and Figure VI-2 shows this relationship for educationally needy students in non-CE schools. Overall, the results show that there is no significant positive relationship between these two variables. For some grades there seems to be a slight positive relationship but it is countered by other grades with slight negative relationships. In Report 7, detailed statistical tests are reported and the overall conclusion

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* The figures show percentage gain in student achievement during the school year: percentage gain equals raw gain divided by the pretest score times 100.

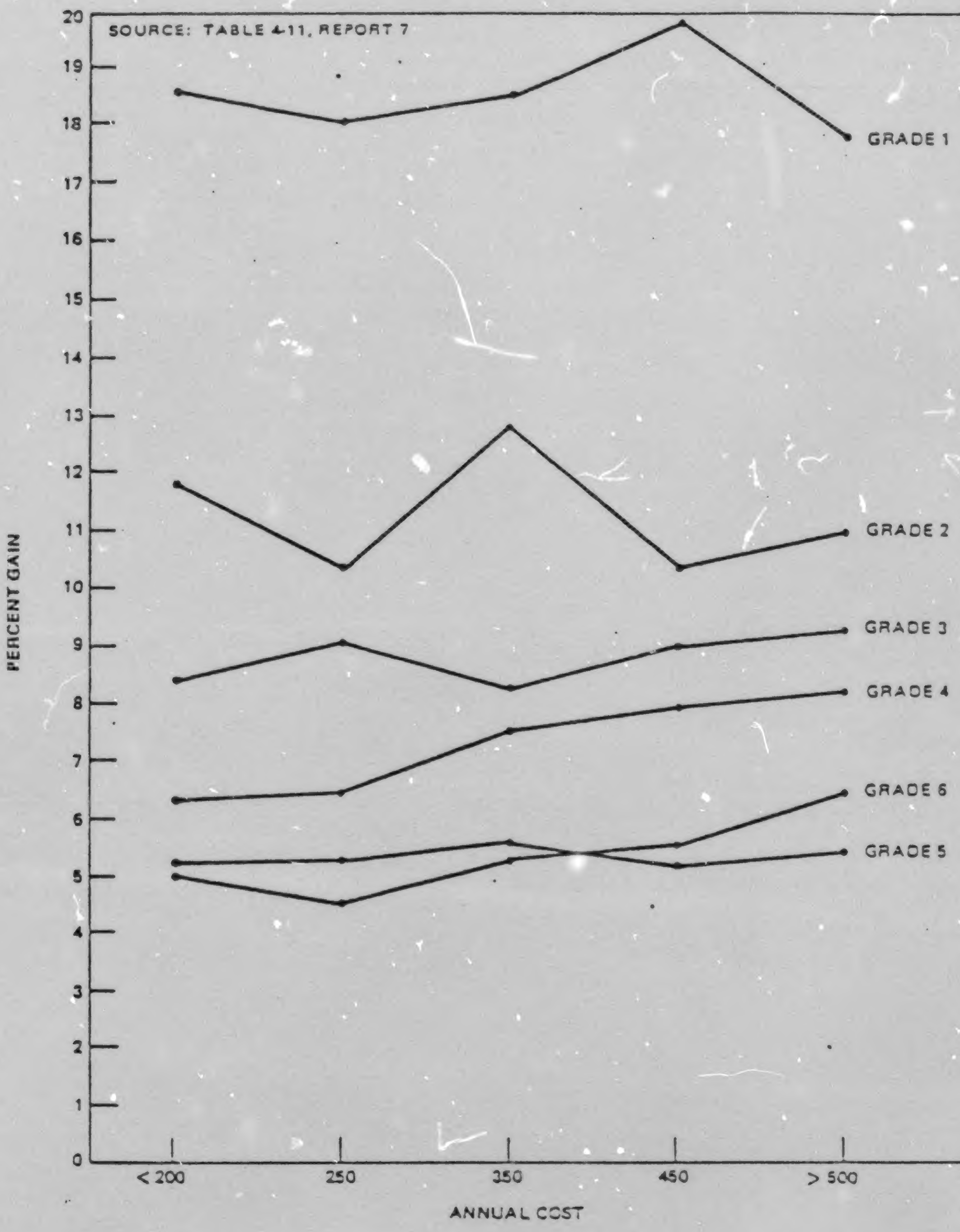

Figure VI-1. Reading Program Costs and Student Gain by Grade--Title I Students

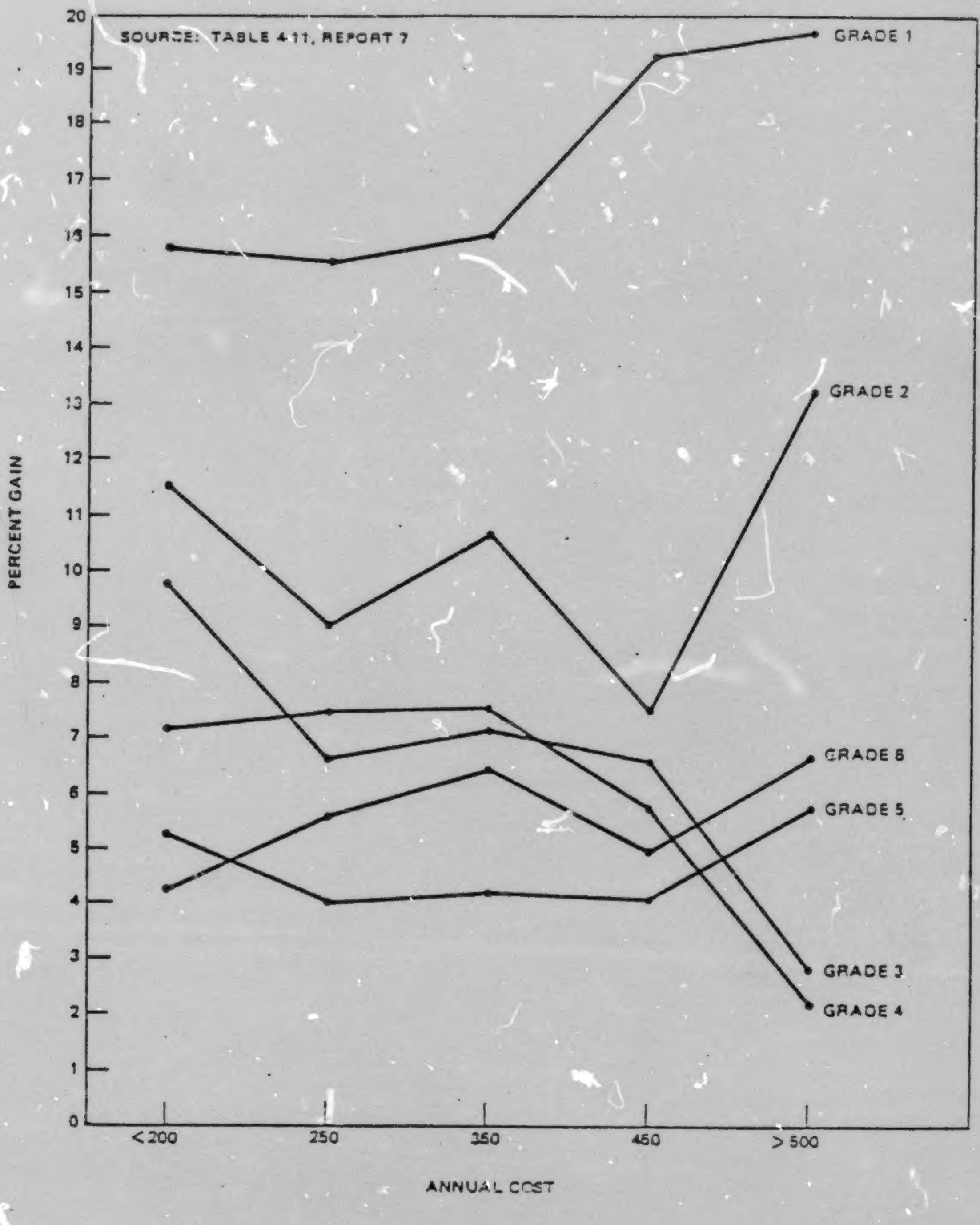

Figure VI-2. Reading Program Costs and Student Gain by Grade--
Educationally Needy Students in Non-CE Schools

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is that there are few statistically significant trends and, where they are significant, they tend to be negative. (This negative correlation means that the most costly the services a student receives the less the achievement gain made by the student.) The authors of Report 7 say:

> "Our results have been nondecisive in the sense that none of our comparisons among groups of students reveal meaningful differences in cost-effectiveness. On the other hand, we are not quite prepared to conclude that the level of resource utilization has no independent effect on outcome. Though small, the raw regression coefficients that served as our indices of cost-effectiveness frequently exceeded two and three times their standard errors, and were often disturbingly negative.
>
> Taking these results at face value, one might conclude that increased utilization of resources has a nuisance effect that tends to diminish achievement across most of the range of program cost that we observed in our sample. If this were truly the case, we might be able to find a critical cost below which the returns to cost are increasing, and above which they are decreasing. We believe such critical points should have been revealed by our models that specified cost in both first and second order terms, but the evidence was not decisive one way or the other."

It can also be argued that the reason for the slightly negative relationships is due to the fact that more resources are given to the more needy students. It is argued that the most needy students will have more difficulty in improving their levels of achievement than less needy students and thus the negative relationship found is determined by the nature of the students receiving the more costly services rather than the ineffectiveness of the increase in services. Figures VI-3 and VI-4 show the relationship between fall reading achievement scores and the cost of reading services received by the students. It will be seen that the lower-achieving students do receive more costly services than higher-achieving students. While the relationships are not strong they are at least large enough to support the idea that the negative relationship between cost and achievement is a function of the achievement level of the students being served. The authors of Report 7 say:

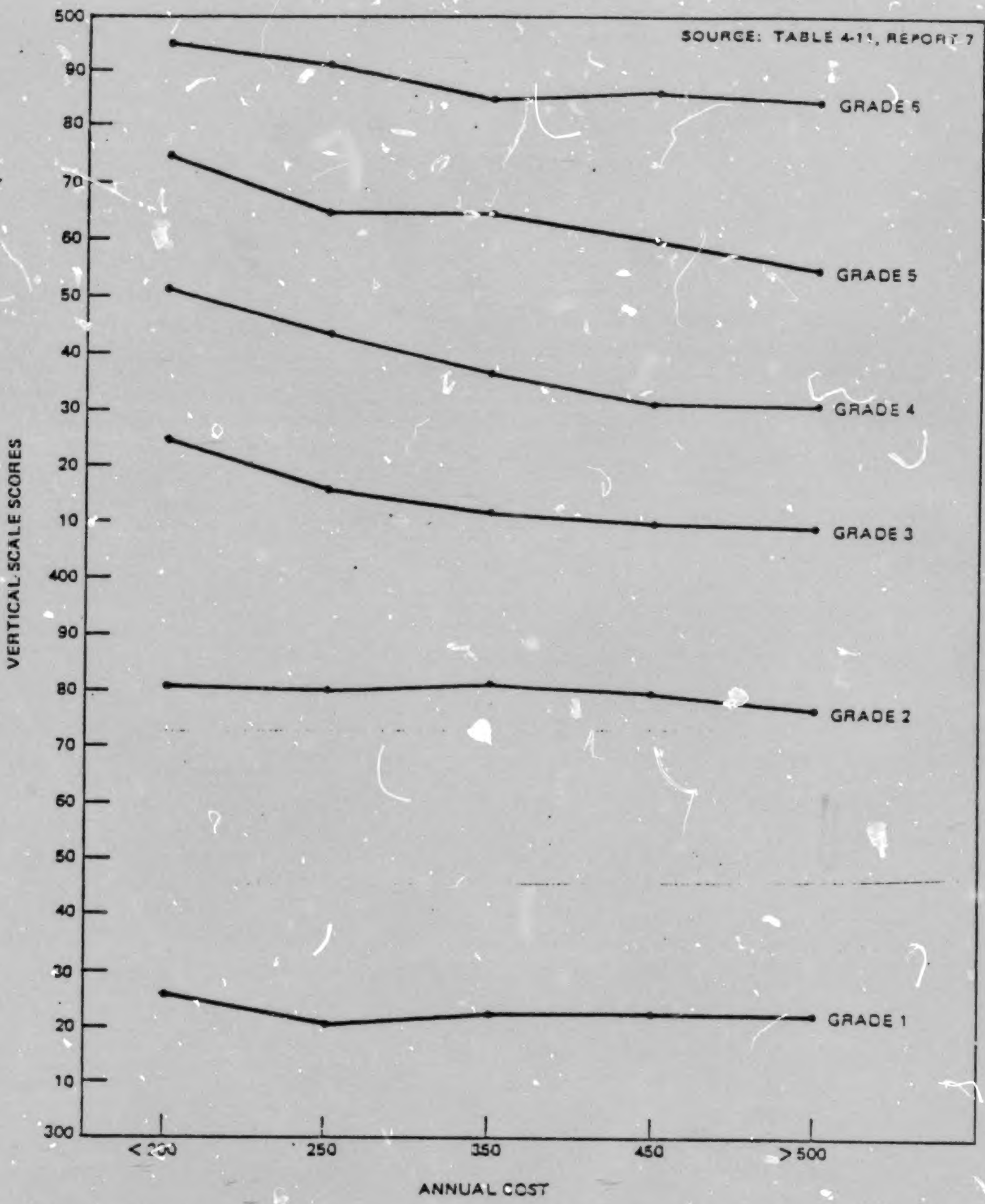
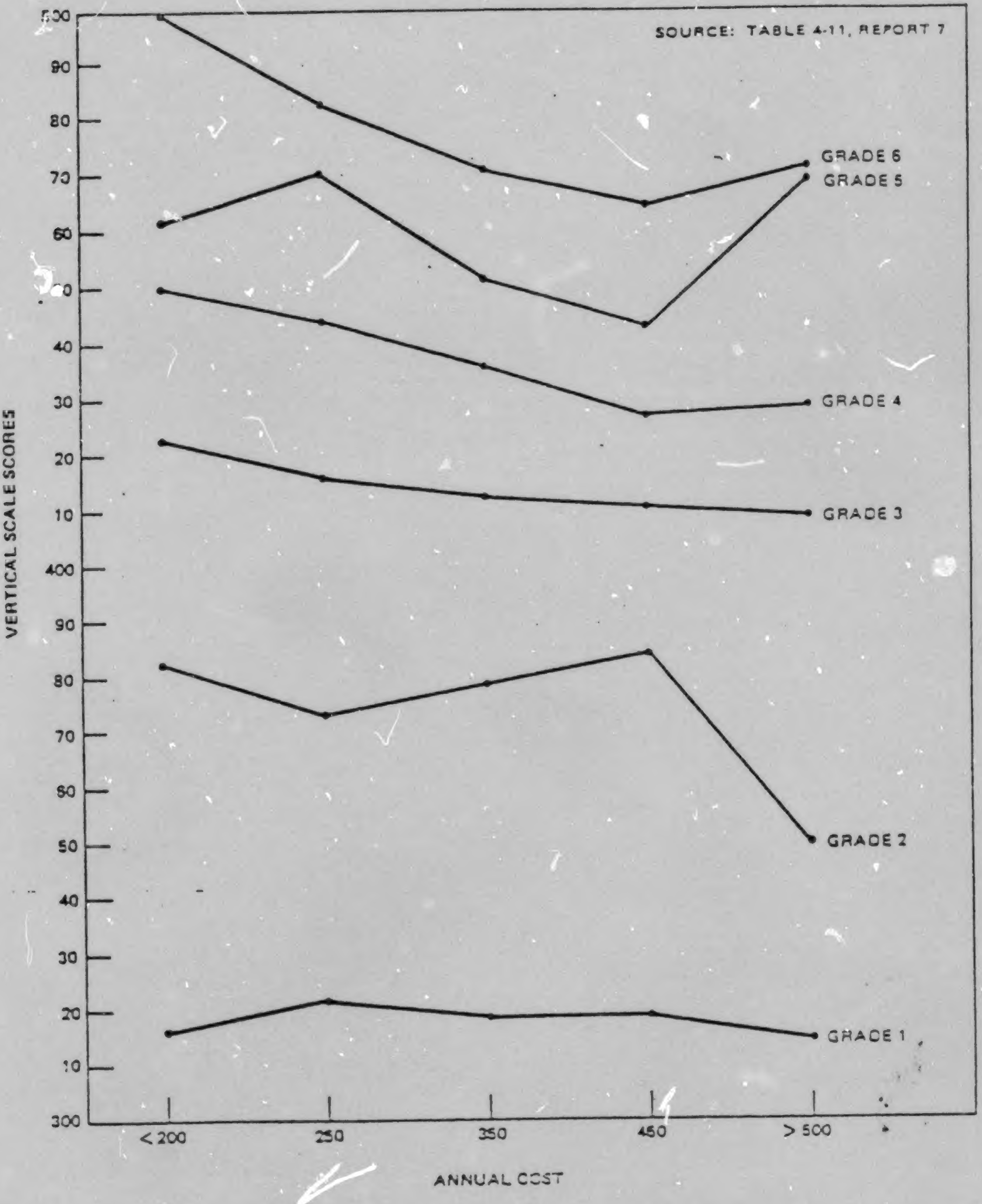


Figure VI-3. Fall Reading Vertical Scale Scores and Program Costs by Grade—Title I Students



SOURCE: TABLE 4-11, REPORT 7

Figure VI-4. Fall Reading Vertical Scale Scores and Program Costs by Grade--Educationally Needy Students in Non-CE Schools

> "Much the same reasoning obtains here as in the area of health care. That is, grieviously ill patients consume more costly and intensive medical care; yet the returns to such medical care, as measured in success rates (cures), are probably lower than those encountered with less seriously ill patients who receive less costly or intensive treatment. In effect, then, the same non-equivalence among treatment groups exists in terms of allocating services."

While it is possible to offer explanations for the negative relationship, it is still important to ask why a fairly strong positive relationship was not found in groups of students homogeneous in achievement level. The idea that increasing the funding, and thus services to needy students, will lead to increased achievement is so pervasive and fundamental to federally-funded programs that these findings must be most carefully examined for faulty analysis. One way of checking the possibility that the results are due to a faulty resource-cost model is to undertake the same analyses using total hours of instruction received by the student (instead of estimates of costs of the resources devoted to this instruction). The use of hours of instruction received is independent of any cost model and in a sense is more basic than a cost-effectiveness analysis. Yet the results are the same as those found with the resource-cost model. The authors say:

> "We are confident that our cost metric is not at fault. For example one might question their use in models with a single cost variable, since this assumes equal returns irrespective of the ways in which resources are deployed. We believe we have addressed this question in the analyses where the data are blocked by program configuration, and total cost is disaggregated into ten program component costs. Another possibility is that the utilization of resources has beneficial effects, but the benefits do not advance as rapidly as do the costs. We have addressed that question by substituting program component hours for program component costs in some of our trials; we still obtained negative regression coefficients for the individualized-instruction components and the special-teacher-instruction components. Therefore, the cause for the negative relationships is not in the cost metric alone."

The resource-cost model used has been criticized by some researchers as faulty. They say that the model does not take into consideration local economies that astute school superintendents may be able to achieve, and that it also improperly lumps together regional variations in costs. In our view these criticisms are irrelevant to the study of cost-effectiveness on a national level. Nevertheless, the importance of the relationship between the costs of services received and gains in achievement is such that we recommend that an independent analysis of the SES cost-effectiveness data be undertaken. It may be that there are some underlying logical flaws in the way the analysis was done, although we doubt this to be the case since the methodology was developed at one of the most prestigious organizations in the cost-benefits analysis field. It is possible that an overall analysis in which all students are lumped together may mask relationships that would be found at the individual school level. In the study of 55 high-poverty schools the relationship between amount of instruction and achievement gains was analyzed. Several different measures of amount of instruction were used but the resulting correlations with achievement gain were modest and contradictory from measure to measure. But based on the present results we believe an independent analysis would be worthwhile either to confirm the results reported here or to clarify the methodological problems in such analyses.

CHAPTER VII. WHEN AND FOR HOW LONG SHOULD STUDENTS RECEIVE COMPENSATORY EDUCATION AND WHAT HAPPENS TO ACHIEVEMENT WHEN STUDENTS NO LONGER RECEIVE COMPENSATORY SERVICES?

Summary

This chapter considers the questions of the best timing of compensatory services and the best duration of such services. It also examines the problems of the frequency of termination of CE services and the changes in achievement growth that result when CE services are terminated. The results show that:

- *There is no one grade in which CE is most effective, but it is more effective in the lower grades than in the higher grades.*
- *There is no evidence that there is an optimum duration for CE.*
- *There is considerable turnover from year to year among the students receiving CE services. About 40 percent of the students receiving Title I in a given year will not receive it in the following year. The turnover is higher in other CE programs.*
- *There are three reasons for this turnover. About 60 percent of the CE students who are discontinued are 'promoted out' because their increased achievement no longer place them among the most needy; 15 percent were promoted to grades that no longer had CE services, and 25 percent were in schools that lost CE funding in the second year (but this was not common for Title I students).*
- *The instructional services received by the students who had lost CE were examined. The services of these former CE students reverted to the same services as received by Regular students.*

- *During the year when CE services had been discontinued, the students who had been 'promoted out' continued to perform at their new levels and did not seem to revert to lower achievement levels.*
- *By the time students reached junior high school, there was no evidence of sustained or delayed effects of Title I.*
- *Former Title I students take more remedial courses in junior-high school than other students.*
- *A student's socio-economic background still plays a very important role in achievement, even in the junior-high school grades.*

INTRODUCTION

This chapter is largely based on three technical reports. Report 14 considers when compensatory services are most effective and how long such services should be continued. Report 11 is concerned with the frequency at which elementary students enter and leave the various CE programs and also with the changes in their achievement when their CE services have been discontinued. Report 17 continues the study of the influence of CE in later school years by examining the achievement of former elementary-school CE students when they are in junior high school.

WHEN AND FOR HOW LONG SHOULD STUDENTS RECEIVE COMPENSATORY EDUCATION SERVICES?

Opinions differ about the time and grade during which students profit most from compensatory education. Some have thought that compensatory services should be concentrated in the primary grades, particularly in the first and second grade, based on the idea that if the students received extra attention very early they would catch up with students who entered school at a higher performance level. It was thought that once students had caught up, they would be able to maintain a level of performance similar to that of the regular students. On the other hand, some have argued that compensatory services should be equally distributed throughout the elementary grades so that whenever students showed poor performance, they could be assigned to compensatory services to assist their performance in subsequent years. Similarly, there has been concern about how long compensatory services should be extended for students who were performing poorly. Some have argued that students who receive only one year of CE may well gain during that year, but that if the special services are not continued they will slip back to their previous poor performance. On the other hand, it has been felt that since there were many more students needing CE services than there were funds available to support such services, it was fairer to "graduate" students who had improved significantly and let other poor performers have the benefit of the extra service. Thus, we examined two questions: first, Is there any particular grade in which CE is most effective?, and second, Is there an optimum duration for CE?

We used two different approaches to answer these questions. First, we simply examined the 'graduation' rates from CE programs for students who had CE for various numbers of years and in various grades. The second approach was considerably more complicated and involved the determination of residual gains based on regression equations. The first approach involves starting with students as they entered the study and tracing their CE participation for three years. Table VII-1 shows the patterns of participation of all students who entered the study in the second grade and continued through the third and fourth grades. The table should be entered in the middle, where it shows that there were 6,385 second grade students of whom 2,350 were judged by their teachers to need CE and 4,035 were judged not to need CE. The table then shows the number, for each successive year, who were assigned to Title I, to other CE, to regular classes where CE was available, and to regular classes where CE was not available. By tracing the history of each student, one can determine the graduation rate for students who had CE for one or two years. Similar tables were developed for all of the cohorts in the study and thus

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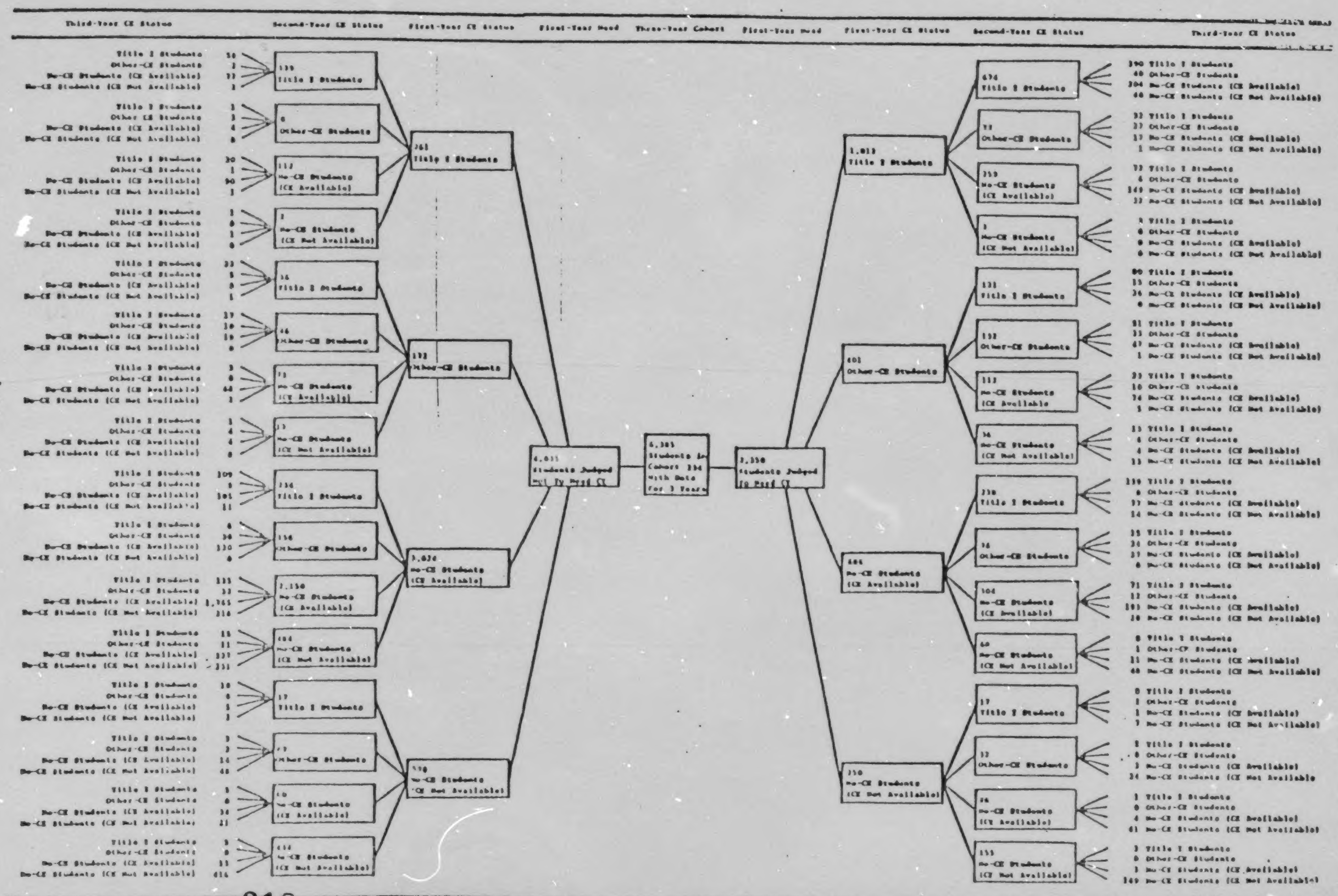
Table VII-1
Numbers of Students by Three-Year Patterns of Participation in Reading CE - Cohort 234


Third-Year CE Status
Second-Year CE Status
First-Year CE Status
First-Year Need
Three-Year Cohort
First-Year Need
First-Year CE Status
Second-Year CE Status
Third-Year CE Status
Title I Students
Other-CE Students
No-CE Students (CE Available)
No-CE Students (CE Not Available)
Students Judged Not In Need CE
Students in Cohort 234 With Data For 3 Years
Students Judged In Need CE

all of the grades were included in the data. Table VII-2 shows the percentage of students who participated in Title I during the first year of the study and who graduated from Title I at the end of their first year of participation.* From the table it can be noted that the graduation rate for the non-needy students was considerably higher than that for the needy students. Second, the graduation rates for math and reading were very similar. A more important comparison for our immediate purposes is the graduation rate across grades. From other data we know that the first-year participation rates are higher in grade 3 than in grade 4. Consequently, if we take these data as reflecting the emphasis of CE at these grades, we would expect inflated graduation rates for cohort 345 (caused by the lower extent of services at grade 4) and deflated rates for cohort 234 (caused by the higher extent of services at grade 3) from the rate expected if there were not grade differences in program emphasis between grades 3 and 4. When taking these factors into account, it appears that the graduation rates are fairly similar among the different grades and we cannot judge any one grade to be preferred to another for the offering of services, at least in terms of their graduation rates.

We have just examined the graduation rates for those that participated in Title I for one year. Similar data were obtained for those who remained graduated during the third year and also for those who entered Title I during the second year of the study and graduated during the third year. Table VII - 3 shows the results. Since the headings in the table may not be completely clear, the first few entries are explained below:

> 51% of the needy, Title I, reading, year-1 participants who graduated at the beginning of year 2 stayed out in year 3.
>
> 31% of the needy, Title I, reading, year-2 participants who had not participated in year 1, graduated in year 3.
>
> 24% of the needy, Title I, reading, participants who participated in both year 1 and year 2, graduated in year 3.

---

* Cohort 123 designates a group of students that started the study in grade 1, and moves successively to grade 2 and grade 3 in the following years.

Table VII-2

Percentage of First-Year Participants Who Graduated Out of Their Title I Program

Cohort	Needy First-Year Participants N	Needy First-Year Participants %	Non-Needy First-Year Participants N	Non-Needy First-Year Participants %
Reading				
123	810	24	222	32
234	937	24	256	43
345	919	28	239	54
456	642	23	141	43
Total	3308	25	858	43
Math				
123	407	32	181	47
234	467	23	202	42
345	513	31	177	49
456	384	31	117	38
Total	1771	29	677	44

Source: Report 14, Table 2-1

Table VII-3

Percentage of Previous Title I Participants Who Were Graduated in the Third Year

Cohort	Needy Participants Who Participated			Non-Needy Participants Who Participated		
	In Year 1, but not Year 2	In Year 2, but not Year 1	Both Years	In Year 1, but not in Year 2	In Year 2, not in Year 1	Both Years
	%	%	%	%	%	%
Reading						
123	51	31	24	59	45	38
234	66	34	32	81	47	56
345	54	47	24	92	56	40
456	44	38	19	61	51	25
Total	55	37	25	77	49	42
Math						
123	51	51	20	78	66	27
234	68	49	32	89	53	41
345	57	40	29	83	62	30
456	50	50	23	68	50	16
Total	56	44	26	81	59	30

Source: Report 15, Table 2-2

First, it can be noted that those participating for only one year, whether year 1 or year 2, remained graduated from the program in year 3 at a higher percentage than those who were in the program for two years. This would appear to mean that those who had only one year of service did better than those who had two years. But we do not know that these groups were equal in initial achievement. Figure VII-1 shows the three-year growth curves for those who received only one year of Title I in comparison to those who had two years, related to the achievement level of the participants. It is clear that those students who had only one year of Title I and then graduated and remained graduated, had a higher level of initial achievement than those who received two years of Title I service before graduating. Thus it seems probable that the higher graduation rates for the one-year participants in Table VII-3 are to be understood in terms of their initial higher achievement levels.

A second point to be observed in Table VII-3 is that those one-year participants who were in Title I during the first year graduated at a higher rate than those who entered Title I during the second year of the study. It seems probable that the second year participants did poorly during the previous year, or were at such a low level that they were assigned to Title I when places became available, but they did not benefit as much from Title I as those who entered during the first year and graduated. Third, non-needy participants are more likely to graduate and remain out, as they most likely began with relatively higher achievement than the needy participants. Finally, to the extent discontinuation of services is determined on the basis of student's school success, the fact that more than one half of the year-1 graduates were able to remain unassisted, can be regarded as evidence of program effectiveness. Also the fact that the percentage of two-year participants who are graduated out in the third year is substantial (about a fourth) and similar to the percent of first-year participants who are graduated in the second year (see Table VII-2), indicates that the Title I program is able to help some lower-achieving students.

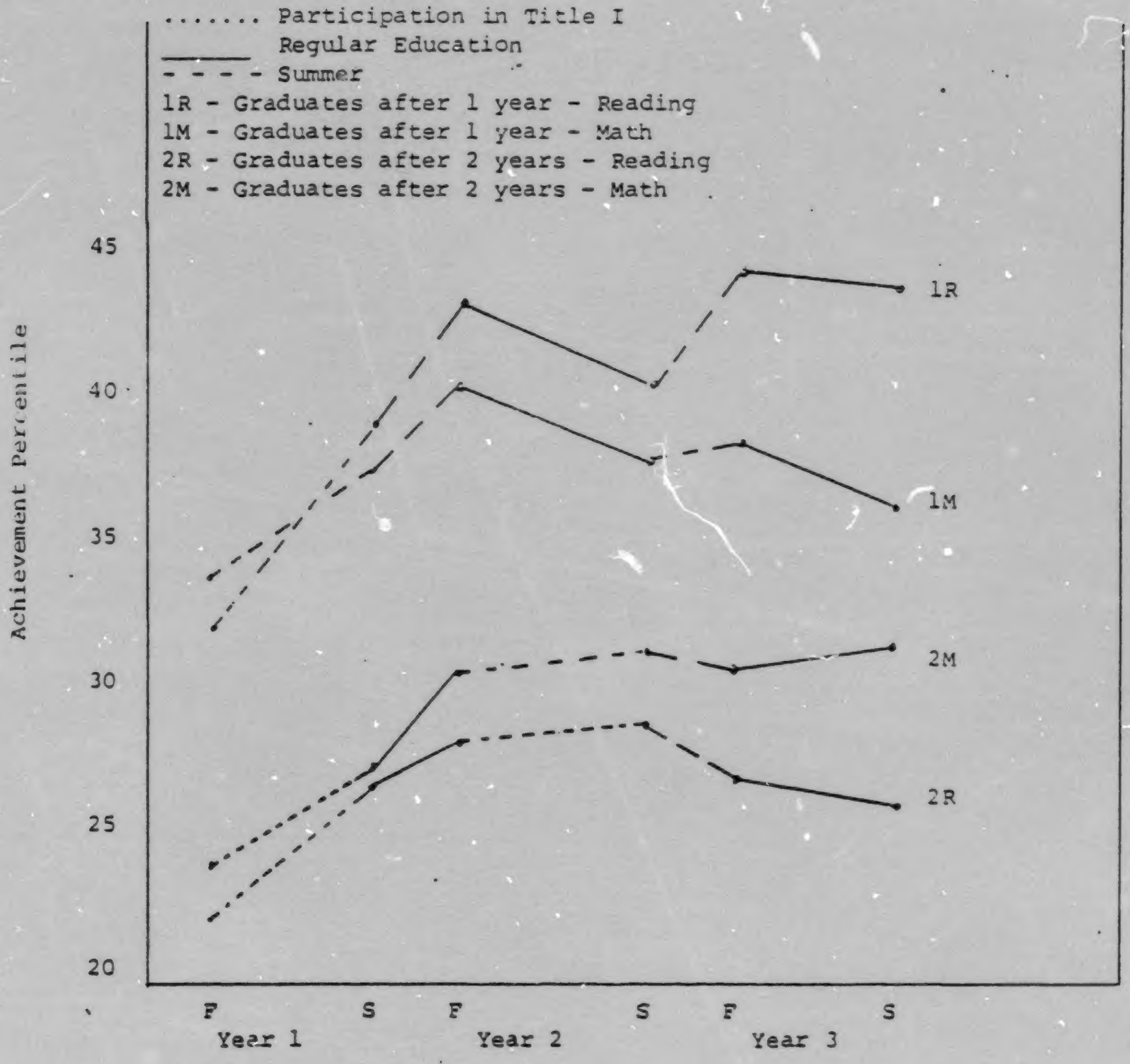


Figure VII-1. Three-Year Growth Curves for Title I Graduates

Source: Report 14, Figure 2-1.

The results just presented had the advantage of being based on simple graduation rates but in interpreting them we had to be concerned about uncontrolled variables such as the achievement level of the students as they entered the Title I program. There were other uncontrolled variables such as socio-economic status, the perceived need for the program, and cultural differences. To take these other factors into account, a more sophisticated statistical analysis was done based on residualized gain scores. The achievement scores were adjusted to 'correct' for a study effect, for individual differences in socio-economic status, for perceived need for CE services, and for cultural differences. The study-effect corrections were based on a small variation in scores based on the year in which the data was collected. As the study progressed, the test scores improved slightly from year to year, probably because the students became test-wise and the teachers became more proficient at administering the tests. The need for the other corrections is shown in Table VII-4, which shows the way in which several student characteristics where related to the number of years they received CE services. (It was possible to include four years of participation by using teachers' reports about receipt of CE during the year before the study began.)

Table VII-4

Characteristics of Students by Years of Participation in CE

Background Characteristics	Years of Participation in a CE Program				
	0	1	2	3	4
			Reading		
Scoioeconomic Status	248	204	177	163	162
Judged Need for CE	0.38	1.08	1.97	2.31	2.50
Similarity to Majority Culture	1.66	1.45	1.29	1.14	1.11
N	21,883	7,098	5,197	3,661	1,554
			Math		
Socioeconomic Status	242	190	165	153	154
Judged Need for CE	0.51	1.23	1.89	2.25	2.56
Similarity to Majority Culture	1.64	1.36	1.15	0.99	0.93
N	26,300	6,380	3,676	2,212	796

Source: Report 14, Table 3-3

It will be seen that, as the number of years that different students were in CE programs increased, the students' socio-economic status decreased, judged need for CE increased, and similarity to the majority culture decreased. These trends are very consistent and need to be accounted for in determining success rates by grade and length of CE receipt. Accordingly each student's scores had correction factors applied to make the data more comparable. The five characteristics (socioeconomic status, judged need for CE, cultural similarity, age at entry into the study and non-English spoken in the home) were used as predictor variables separately for adjusted reading and math achievement scores in a regression analysis at each of the twelve data points defined by grade-testing occasions. The achievement predicted could then be subtracted from the new scores, so that the effects of background on achievement would not obscure our findings. Table VII-5 shows the average residual vertical scale scores resulting from these adjustments, as a function of years of participation in CE programs for each grade and testing occasion. First, it should be noted that in both reading and math, all the residual means are positive for the students who did not receive any CE. A positive residual implies that the group's actual performance is better than expected on the basis of the regression equation. Also it can be seen that almost all of the groups with at least one year of CE have negative residuals. If wer consider the overall average residuals (the bottom line of Table VII-5) as indexes of the need for CE by each group, those students who received only one year of CE needed it least, and the others are about equal in their need. Furthermore, the earlier the need for CE was identified, the more students were able to benefit from CE services. Four years of reading CE appears to be beneficial if started in grade 1, however by grade 5, four years is much less effective. In math, the situation is similar, expect that the beneficial effects of four years of CE extend beyond the first grade. Based on these data, we conclude that there is no optimal amount of CE; however early treatment appears to be effective.

Figure VII-2 shows plots of the adjusted residualized scores for each group having CE for various periods of time against the year of the study. It will

Table VII-5

Mean Residual Achievement Scores at Each Grade and Testing Occasion for Groups Based on Years of Participation in CE

		Reading					Math				
Grade	Testing	Years of Reading CE					Years of Math CE				
		0	1	2	3	4	0	1	2	3	4
1	F	3.2	-2.5	-6.3	-4.5	4.5	1.9	-3.6	-5.6	-3.0	3.4
1	S	5.9	-3.6	-11.4	-8.7	2.2	2.4	-5.6	-7.9	-2.9	10.1
2	F	6.6	-3.8	-11.8	-9.1	-3.7	3.3	-6.5	-8.0	-3.7	-2.3
2	S	7.0	-4.5	-11.6	-9.6	-4.7	3.3	-6.5	-9.3	-4.9	3.6
3	F	7.3	-4.5	-11.6	-9.8	-9.8	3.2	-6.2	-9.1	-6.0	4.4
3	S	7.4	-5.8	-12.0	-9.1	-6.7	4.0	-9.3	-9.6	-6.3	5.7
4	F	7.3	-5.5	-11.1	-10.1	-11.3	3.9	-8.0	-9.3	-7.1	-0.9
4	S	7.3	-5.5	-10.9	-10.4	-11.5	4.6	-8.4	-11.1	-10.4	-5.1
5	F	6.7	-7.0	-9.3	-12.0	-16.3	3.8	-8.5	-9.6	-7.8	-6.3
5	S	7.3	-8.7	-10.3	-10.6	-17.4	4.1	10.1	-11.0	-10.3	-8.9
6	F	7.4	-10.4	-11.9	-13.3	-20.4	4.4	-12.2	-14.0	-2.7	-14.1
6	S	7.3	-11.2	-11.8	-12.1	-17.7	4.4	-13.9	-12.2	-1.4	-9.2
Average		7.0	-6.0	-11.0	-10.0	-10.3	3.8	-8.2	-9.8	-6.4	-0.9

Source: Report 14, Table 3-7

be seen that the regular students have positive residualized scores. However, the other groups of students have negative scores which tend to be rather close together. At first, it seems for reading that one year may be most effective but then four years approaches it in the final test period. For math one, two, and three years of CE seem to be similarly effective, with four years being most effective. In looking over all the data we cannot see a consistent trend that indicates an overall optimal duration of CE participation.

Similar curves were drawn for the grade at which there was participation in CE, as shown in Figure VII-3. The dotted portion of the lines shows the year of participation in CE. It will be observed that as the year of participation in CE increases from prior to grade one, to grade one, to grade two, etc. through grade six, there is a steady decrease in the residualized scale scores. This evidence seems to indicate clearly that earlier participation serves an important preventive function. Other less obvious implications of Figure VII-3 are:

> The decreases in means with increasing grade of participation are a bit larger for reading than for math, indicating that math CE has a stronger effect on math achievement than reading CE has on reading achievement.
>
> The decreases with increasing grade of participation are observable at the initial testing, the testing just before participation, the testing just after participation, and at the last testing.
>
> The dotted line segments are usually preceded by decreases in achievement and followed by increases in achievement at the early grades, but by further decreases at the later grades. The implication could be that CE has some sustaining effects at the early grades, where the participants are less seriously in need and where CE has more immediate impact.

With all these considerations in mind, and with the additional consideration of supportative findings from Chapter V, we conclude that CE in the lower grades is more effective than in the higher grades.

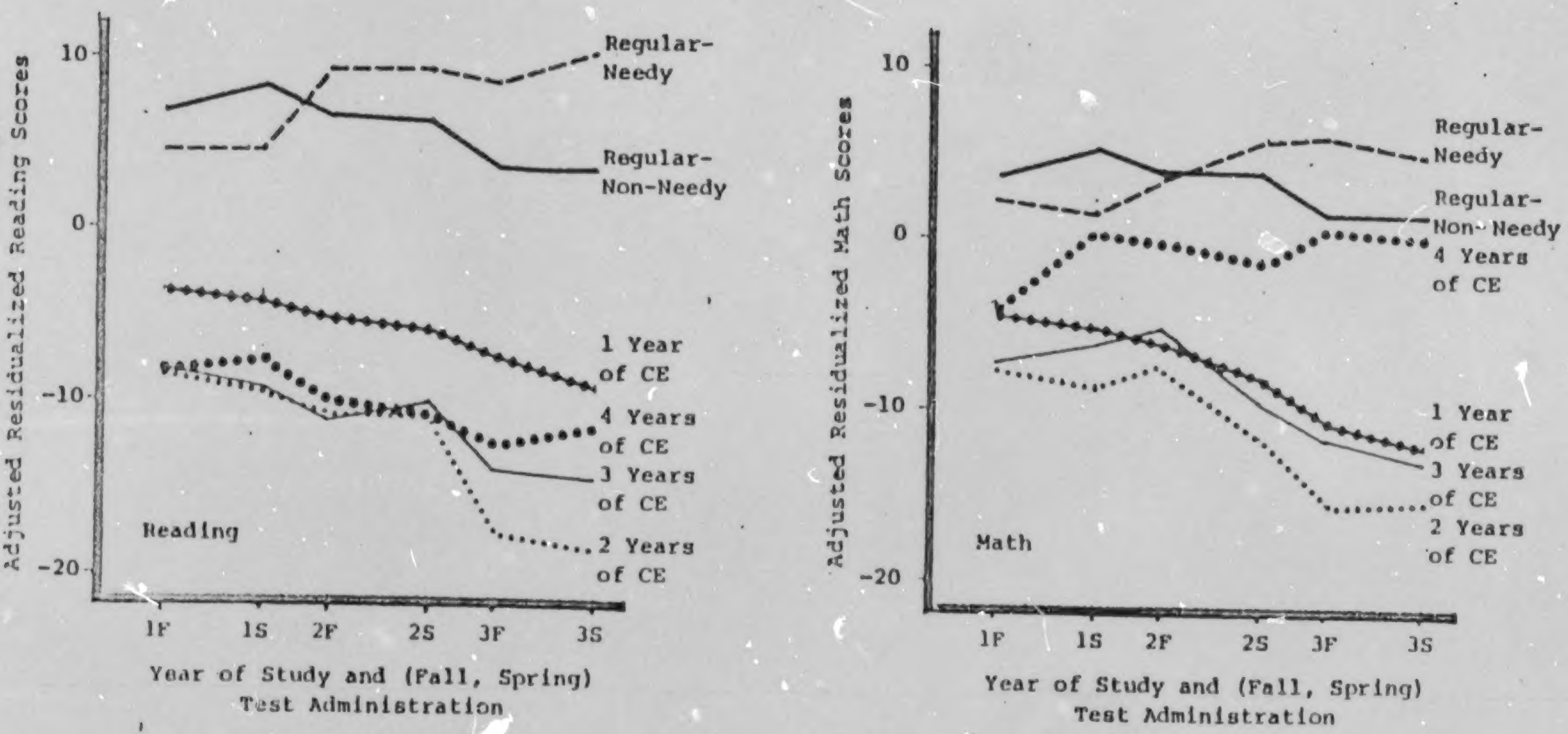
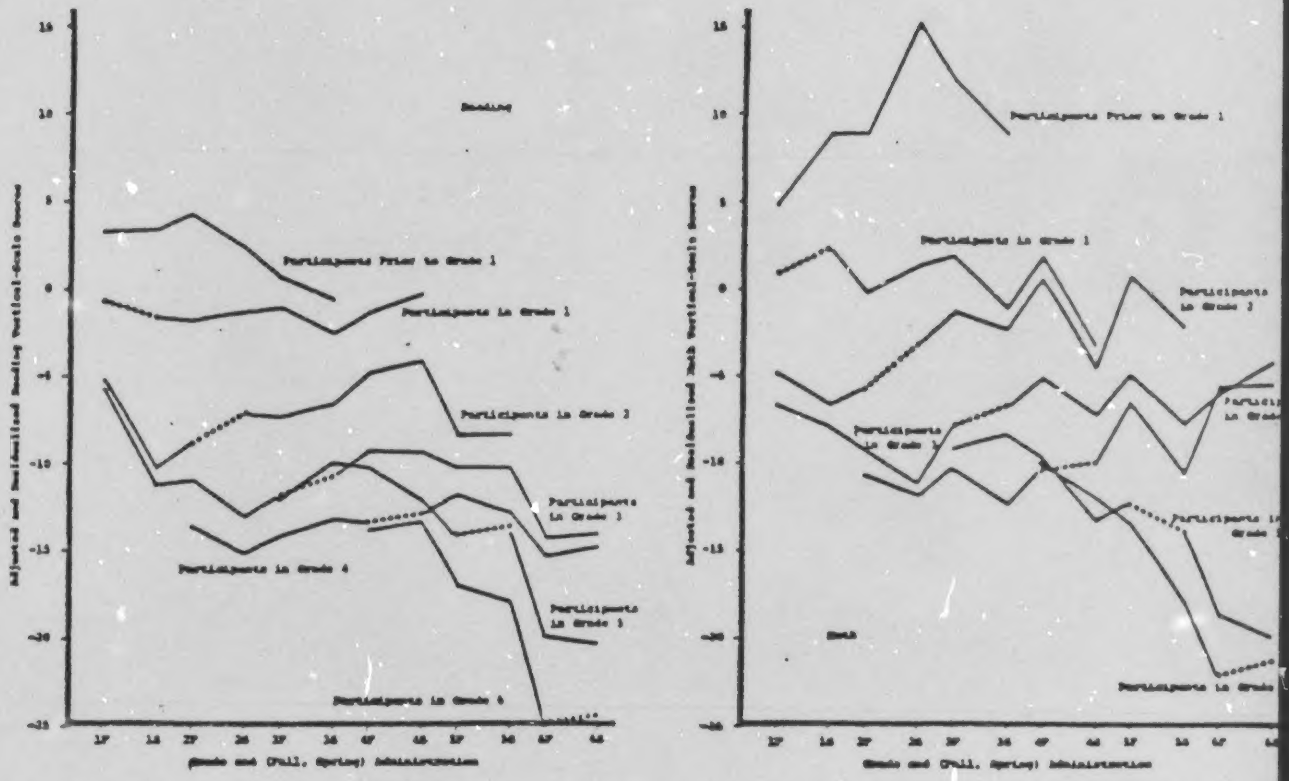


Figure VII-2

Relative Achievement and Years of Participation in CE Programs

Source: Report 14, Figure 3-2



Source: Report 14, Figure 3-3.

Figure VII-3

Relative Achievement of Students Participating in CE Programs at Each Elementary Grade

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WHAT HAPPENS TO THE ACHIEVEMENT OF STUDENTS WHEN THEY NO LONGER RECEIVE CE?

The discontinuation of CE services became an important educational issue when it was reported (GAO, 1975) that districts and schools differently interpreted the Title I requirement to serve the most educationally deprived students. Under one interpretation, as long as the student is among the low achieving when entering the program, that student is to be retained until reaching an age-appropriate achievement level. Under another interpretation, a student has to remain among the most educationally deprived to be retained in the program; otherwise, the student is replaced by a student who is lower achieving. Under a third interpretation a student is retained in the program even after reaching an age-appropriate level, in the belief that the extension of services is necessary to maintain achievement growth. Based on these GAO findings and on recommendations from states, districts, and the USOE, bearing both on student needs for stable programs and institutional needs for educationally sound guidelines, Congress clarified the law (Education Amendments of 1978, Public Law 95-561). The amended law emphasizes that Title I funds must be used to meet the needs of students in greatest educational need, but it provides an exemption (among several) for students who were determined to be in greatest need in a previous year but no longer are. In effect, the amendment allows schools and districts to maintain Title I services for students who qualified in the previous year, so that students are not caught in a "revolving door" of alternating receipt and disqualification.

But the GAO findings were based on less than representative data and the recommendations from other sources tended to be based on impressions and anecdotes. In the Sustaining Effects Study it was possible to study the problem in detail and determine whether or not it was serious. Three questions were studied:

1. What is the incidence of the discontinuation of CE services?
2. What educational services do students receive after their CE services are discontinued?

3. What happens to the achievement levels of students after their CE services are discontinued?

For the major study, data were available for the 1976-77 and the 1977-78 school years. Data from the 1977-78 school year were more reliable because we had positive records of each student's status in the previous school year. For the 1976-77 school year the students' statuses were reported as teachers remembered them and were thus subject to some error. The two data bases were analyzed separately and tend to support each other. Therefore, only the results from the 1977-78 school year will be reported here and are given in detail in Report 11.

What is the Incidence of the Discontinuation of CE Services?

Three reasons for the dicontinuation of CE services were available for study: first, services were discontinued because the student had reached an achievement level that no longer qualified the student for CE services; second, services were discontinued because a CE student was promoted to a grade which did not have CE services; and third, the student was in a school during the second year that lost funding in the second year even though it had funding in the previous year. About 60 percent of the students no longer receiving CE services had them discontinued because they were no longer qualified due to high achievement; 15 percent were no longer selected for CE because they were promoted to grades in which there was no CE program, and 25 percent were discontinued from CE because their schools lost CE funding (although this was not common for Title I students).

There are two ways of looking at the data. On the one hand we can ask what percentage of all the students in the school have their services discontinued; on the other hand we can be concerned about the percentage of studnets in a particular CE program who have services stopped. Table VII-6 shows the data both ways. When viewed from the perspective of all the students in the school,

Table VII-6

Percentage of Students Whose CE Was Discontinued, by Reason for Discontinuation, CE Funding Source, and Subject Matter

Title I	% of All Students		% of Title I Students in Year 1	
	Reading	Math	Reading	Math
Former Title I students no longer qualified	6	4	34	32
Former Title I students but school lost funding	0	1	0	7
Former Title I students but promoted to non-Title I grade	1	0	5	4
Title I students in both Year 1 and Year 2	12	7	61	57
New Title I students in Year 2	10	8		
Not Title I students in either Year 1 or Year 2	72	80		
Other Federal CE	% of All Students		% of Other Federal CE Students in Year 1	
Former Other Federal CE students no longer qualified	1	1	21	22
Former Other Federal CE Students but school lost funding	2	1	41	33
Former Other Federal CE students but promoted to grade without Other Federal funds	1	1	20	25
Other Federal CE students in both Year 1 and Year 2	1	1	19	21
New Other Federal CE students in Year 2	2	1		
Not Other Federal CE students in either Year 1 or Year 2	94	96		

Source: Report 11, Table 1-1

the problem does not seem particularly large. Depending on the CE program involved and the subject matter, the percentages vary, but about 5 percent of all the students have CE programs discontinued. The more important figures are the proportion of CE students who have CE services discontinued. For Title I about 40 percent of the students receiving Title I services in one year will not receive Title I services the next year. For both other federal programs and state/local programs, the turnover is considerably larger than in the Title I program. The students losing Title I services are mostly those who no longer qualify because their academic achievements place them above other more needy students. For the other federal and the state/local programs there is a much stronger tendency for the schools to lose funding or to have the students promoted to a grade without that category of funding.

(Table VII-6 Cont'd)

State and Local CE	% of All Students		% of State/Local CE Students in Year 1	
Former State/Local CE students no longer qualified	2	1	21	18
Former State/Local CE students but school lost funding	4	2	36	32
Former State/Local CE students but promoted to class without State/Local funds	1	1	7	16
State/Local CE students in both Year 1 and Year 2	4	2	35	34
New State/Local CE students in Year 2	7	6		
Not State/Local CE students in Year 1 or Year 2	83	86		

Table VII-6 clearly demonstrates that there is considerable turnover among CE students. But is there evidence that there really is a difference in achievement levels between those whose CE is discontinued and those who continue in the CE program? Table VII-7 shows the average Comprehensive Tests of Basic Skills achievement percentiles for the different groups in terms of their statuses in Year 2. The scores are for the spring of the first year because that period represents the time when achievement information would be available for decisions about assignment to the ensuing year's classes. The table shows that the regular students are slightly above the mean in achievement while all categories of previous and present CE students are considerably below the mean. Students who have had their CE services discontinued for one reason or another fall considerably below the regular students but considerably above those who continue in the CE programs. Those continuing in the program have achievement means in the 25th percentile range, while those whose services have been discontinued tend to be in the 35th percentile range. Thus it is apparent that students whose CE is discontinued are those who are performing relatively well and that those who are retained in the programs are still performing poorly. These figures indicate that CE administrators are behaving appropriately in deciding which students to retain in the program and which ones to 'promote out.' At the same time we should not forget that those who were 'promoted out' were not doing as well as the regular students.

Clearly for CE students there is a large turnover, with many students receiving CE services in one year and then having them discontinued the next year. How serious is this? One way of looking at it is to say that it is not serious at all. If in the second year the student is clearly not as needy as other students, then the other students should receive the services and, with limited funds, the less educationally needy student should be dropped from the program. But, if in the process the student whose services were discontinued drops back and again joins the most needy ranks, then the programs' goals are undermined and we have a revolving-door process. But this is only a potential problem; what really happens to students who have been promoted out because they no longer qualify?

Table VII-7

Average CTBS Percentile Scores Over All Grades by Transition Category
(Percentile Scores for Spring of Year 1, Transition Categories for Year 2)

Transition Category	Mean CTBS Percentiles	
	Reading	Math
Regular students	55	51
Discontinued from CE in Year 2:		
Due to high achievement	34	38
Due to promotion to non-CE grade	30	35
Because school lost funding	34	37
CE Students:		
Continuing in program from Year 1	22	26
Started CE in Year 2	32	33

Source: Report 11, Table 1-9

Educational Services After Termination of CE

The regulations for Title I, by far the largest of the CE programs, specify that CE services are to supplement rather than supplant regular instruction. Because the number of hours in the school day is usually not increased for CE students, the CE program usually consists of different instruction which is of greater intensity or higher quality than that for regular students, as we noted in Chapter III. Or the CE program may emphasize instruction in reading and math at the expense of other subjects being taught to the regular students. When a student's CE services are discontinued, we would expect that the hours and costs of reading and math instruction would revert to approximately that of regular students. Is this actually the case?

Table VII-8 shows the hours and costs of reading and math instruction averaged over all grades by student category. The table shows that the number of hours and costs of instruction for continuing CE students are considerably higher than they are for regular students. The corresponding figures for students whose CE has been terminated are quite close to those for the regular students. There are wide variations in the services offered from grade to grade in reading, however, so the average figures do not give the whole picture. Figure VII-4 shows the cross-sectional costs of instruction by grade. Again, we see for reading the marked decrease in the cost of reading instruction as grade increases, and we also see the much higher costs of the reading services offered to CE students. There seems to be a slight tendency for discontinued students to receive more costly services than regular students, but they are clearly differentiated from the continuing CE students. A similar figure for math would show the same picture as that for reading, except that math instruction costs are relatively constant across grades. From this material

Table VII-8

Average Hours and Costs of Instruction During the Second Year by Student Transition Category

Transition Category	Reading		Math	
	Hours	Cost*	Hours	Cost*
Regular Students	238	245	175	136
Discontinued from CE in Year 2:				
Due to high achievement	242	281	184	172
Due to promotion to non-CE grade	226	281	166	150
Because school lost funding	246	295	179	158
Continuing CE students	265	420	208	278

* Standard resource dollars
Source: Report 11, Table 2-1

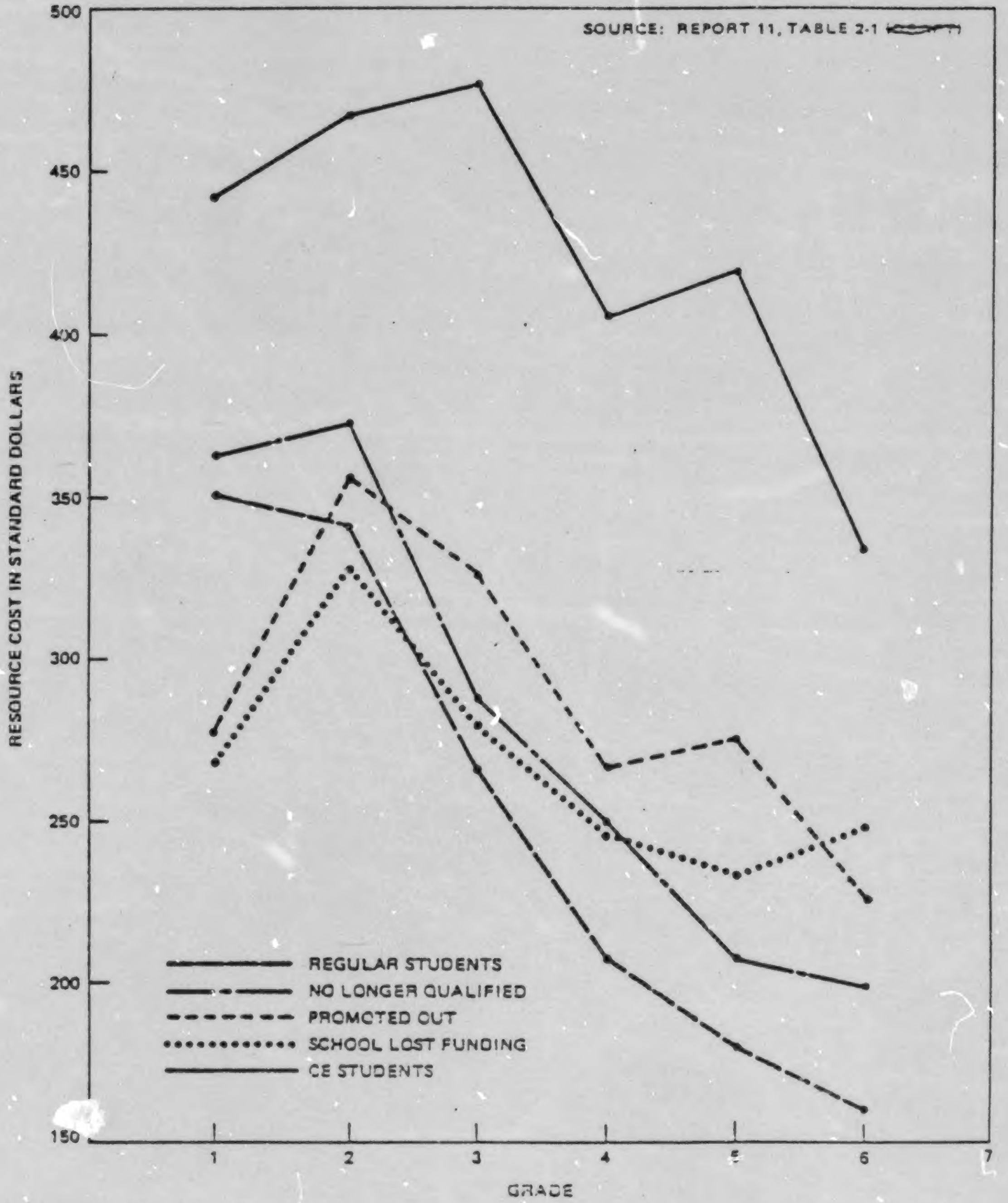

Figure VII-4. Resource Cost of Reading Instruction Offered

it is clear that when students are terminated from CE they really do stop receiving the services they would have been receiving if their CE status had not changed. When one looks at the nature of this change, it becomes apparent that the discontinued students are getting their instruction from regular teachers rather than from special teachers in small groups. This may not necessarily be bad. We have already seen that regular teachers tend to be associated with superior instructional results. What in fact happens to the discontinued students? Do their achievement levels drop as a result of the lack of more costly and intensive services?

Achievement After Termination of CE

We now know that students are terminated from CE programs for a number of reasons, and that high on the list is termination because they are achieveing at a level that is relatively high. We also know that if a CE student is terminated, then the new instructional program takes on the characteristics of the regular program. The question now is whether the terminated CE students retain their relatively high levels of achievement or whether they revert to previous lower levels. There are two ways of looking at this question. One way is to determine the relative achievement status of the students at the end of the next instructional year to see if they still are achieving at relatively high levels. The other way of addressing the question is to look at rates of growth during the subsequent school year to see if they continue growing at the same rate as when they were receiving CE. Both approaches will be examined. Table VII-9 gives the percentile achievement levels for students in the spring of the second year. This table is for Title I students. Similar data are available for other federal programs and for state/local programs, and the interested reader can refer to SES Report 11 where it will be seen that the results are similar to those for Title I. The table shows, for both reading and math, that the regular students achieve in the spring of the second year at levels considerably above the average. Those Title I students whose CE program continued during the second year are still performing at quite low levels. However, those students who had been Title I students, and

Table VII-9

Average Reading and Math Percentiles for Spring of the Year After CE Students Were Discontinued

Category	Grade				
	2	3	4	5	6
Reading					
Regular students	61	63	65	60	58
Continuing Title I students	24	26	17	20	17
Students Discontinued from Title I:					
Due to high achievement	36	42	37	28	30
Due to promotion to class without Title I	41	34	30	32	36
Because school lost funding	-	-	-	-	-
Math					
Regular students	59	59	56	59	58
Continuing Title I students	33	23	25	22	31
Students Discontinued from Title I:					
Due to high achievement	41	41	37	33	35
Due to promotion to class without Title I	48	48	30	22	24
Because school lost funding	39	45	30	38	36

Source: Report 11, Table 3-3

whose services were discontinued due to their higher achievement continued to perform at levels which, while not equal to the 'regular' students, are much higher than for those students who continued in Title I. It certainly appears that those students who had their services discontinued did not drop back to the level they were at when they entered Title I.

The second way of examining the question of whether the discontinued students have continued to grow at rates similar to rates while they were CE students is to examine growth curves. The general idea is to determine the rate of growth of the student during the year in which the student received CE and then to compare that growth rate with the growth rate in the next year when the student did not receive CE. This is a somewhat complex and inexact comparison due to several factors. First, we know that the measured rate of growth decreases for each successively higher grade and thus the second year's growth should be somewhat less than the first year's rate. A way to get around this difficulty is to form comparison groups and see if the growth of those whose CE services were discontinued is similar to the growth of those whose services were continued (or a similar comparison can be made with regular students). The problems with this method are that students of different achievement levels grow at different rates, and regression-to-the-mean effects are different, depending on achievement level. While bearing these problems in mind, we attempted to compare growth rates. The general method was to determine the growth that took place in the first year and from that growth to predict the growth that should take place in the second year. Then the actual growth in the second year was compared with the predicted growth in the second year. The difference between the predicted growth and the actual growth is called the difference score. If the student grew more than was predicted then there is a positive difference score, and if the student grew less than predicted there is a negative difference score.

Table VII-10 shows the residualized gain scores during the second year for students who had been Title I students in Year 1 but where services were discontinued in Year 2. Their gains are compared to their previous year gains and to the gains for regular students, and for students who received Title I services in both Year 1 and Year 2. (Similar results were obtained for the other funding categories and can be examined in Report 11.) Discontinued Title I students had lower gain scores than regular students in comparison to the growth rates for the students who received Title I services in both Year 1 and Year 2. The discontinued students have positive growth rates. While this positive growth is encouraging and consistent with the general finding that Title I has a positive effect, the conclusions need to be tempered by remembering that these students come from the lower part of the achievement distribution and will exhibit higher regression effects than the other two groups.

Table VII-10

Average Residual Gain Scores from Year 2 for Students Discontinued from CE Due to High Achievement.

	Grade				
	2	3	4	5	6
Reading					
Regular students	-22	-6	-14	-12	0
Continuing Title I students	6	4	18	3	12
Students whose Title I was discontinued	-6	-2	0	-8	1
Math					
Regular students	-12	-17	-14	-16	-9
Continuing Title I students	9	9	9	4	6
Students whose Title I was discontinued	27	11	10	-4	-7

Source: Report 11, Table 3-6

In math, the previous Title I students seem to surpass their expected Year 2 growth when they are in grades 2, 3, and 4, but not to exceed expectations in grades 5 and 6. (In interpreting these figures we must remember that they are expressed in vertical scale scores and not percentiles. Generally, a gain of about six vertical scale scores is required to be significant at the .05 level.)

The conclusion to be drawn is that those students who have had their Title I services discontinued continue to grow in the next year at about the rate that would be expected if they had continued to receive Title I services. The data supporting this conclusion are not as clear as would be desirable because they are contaminated by the fact that comparison groups come from different levels in the achievement distribution and thus grow at different rates, and also by the problem of differential regression rates. However, when we consider the results based on growth rates and the results based on the percentile scores achieved in the spring of the second year, we feel safe in concluding that the discontinuation of CE services for the higher of the low-achieving CE students does not result in an impairment of their achievement growth in the subsequent school year. But the firmness of this conclusion is somewhat tempered by the results from the three-year longitudinal data. Referring back to Figures V-7 and V-8 we can examine the continuing performance of Title I students who received Title I during only the first year of the study. It will be seen for reading that these students tend to retain their relatively high performance after they are no longer receiving Title I. However, for math the picture is not as encouraging, with the former Title I students tending to lose their percentile achievement level, but still remaining above other Title I students. With these students we do not know how many lost their Title I services because they were 'promoted out' but we do know that in math, more frequently than in reading, students lose their services for funding and administrative reasons. Considering both the results of the longitudinal study and the results of Report 11, we believe the 'promoting out' of high-achieving Title I students does not do them any great disservice.

THE EFFECTS OF ELEMENTARY-SCHOOL COMPENSATORY EDUCATION ON STUDENTS WHEN THEY ARE IN HIGH SCHOOL

Originally the Sustaining Effects Study was not designed to follow students beyond the sixth grade, but as the study matured it was realized that it would be desirable to follow some students into high school. By the late 1970's education policy makers believed the federally supported compensatory education programs in the elementary grades were well in place in offering assistance to disadvantaged students in these grades. However, it was not clear that the elementary grades were the best grades in which to give remedial services. It was also apparent that little federal money was going to secondary schools to assist students at that level who were having difficulty mastering basic subjects. Larson and Dittmann (19) studied this question and suggested that limiting compensatory intervention to the early grades would make sense only if the skills acquired in those grades were the only skills society believed important for disadvantaged students. They also suggested that overcoming deficits at early ages may not be as critical as overcoming them at later ages. They also argued that even if early compensatory efforts were effective, their impact may dissipate without maintenance efforts. In view of these concerns we were asked to try to follow some of our students into junior high school to determine the influence elementary school CE might have on secondary school achievement. We collected data at the junior high school level to try to answer the following questions:

1. Are the achievement benefits of CE received in the elementary grades, sustained into the junior high level?
    - a. What is the long-term effect of CE participation on achievement?
    - b. Does intensity of instructional services have a delayed effect on achievement?
2. What effect do secondary school courses have on the achievement of former CE participants?
3. How do student background characteristics relate to achievement in secondary school?

Since we are mainly concerned with the effect of compensatory education we limited our selection of students to those from high-poverty elementary schools. We selected 51 schools with more than 20 percent of their students below the poverty line. These schools were fairly well distributed throughout the country. Since we had not planned to follow these students into secondary school we had no records to tell us where they had gone on leaving elementary school. We asked the local coordinator in these elementary schools to search the records of the secondary schools where their pupils normally went on graduation and to try to locate the students studied at the elementary school. The exact way we located the students is described in Report 17, but generally, for these schools, we were able to locate and test about one-third of the students who had been in the study and graduated from the elementary grades. After excluding from the sample all the students who had missing data, there were roughly one thousand students in each of three cohorts; those who made up cohort 4, those who had been in the study during elementary grades 4, 5, and 6; cohort 5, those who had been in the study during elementary grades 5 and 6; and cohort 6, those who had been in the study during grade 6. In the spring of the school year we administered to those students the appropriate scales from the Comprehensive Tests of Basic Skills. Thus, the test was administered to cohort 6 in their 9th grade, to cohort 5 in their 8th grade, and to cohort 4 in the 7th grade.

In reviewing the characteristics of the students who remained in the sample it was clear that the sample was not representative of all CE students due to differential attrition. Report 17 discusses this attrition and it can be summarized by saying that non-Hispanic speaking Asian students, students who speak only English, students who do not participate in free meals programs, and students with more educated parents, are more likely to remain in the sample. In spite of the somewhat biased nature of the sample it still contained a large number of CE students from poverty backgrounds. In our analysis we attempted to account for these systematic biases.

In the analyses we had available the following variables: the background of the students, whether or not the student participated in CE, the intensity of the CE instruction, the hours of secondary school instruction in reading and math, the mix of secondary school instruction between remedial courses and regular courses, and the achievement measures obtained during both the elementary school years and one secondary school year.

First we investigated the extent to which these students continued to make remedial courses in junior high school. It was found that, in terms of the total reading and math courses taken, the former Title I students, relative to students who had not had Title I, did not receive more reading instruction at the junior high school level, but they did receive slightly more math instuction. Each additional year in junior high provides less reading instruction, but each additional year provides roughly the same number of hours of math instruction. However, when we consider the course mix we find that the former Title I students take considerably more remedial coursework in junior high school than do students who had not had Title I in elementary school. In other words, the former Title I students are still finding it necessary to take remedial work while regular students do not need these more basic and easier courses.

In following achievement growth it is possible to form eight different groups of students in terms of whether or not their elementary teachers judged they needed CE, whether or not they had CE in the elementary grades, and whether or not they took remedial courses in junior high school. In Report 17 there are graphs showing the achievement growth curves for each cohort and for each of the four different academic subjects. Since these many curves are quite similar we have only reproduced one of them here. The one shown in Figure VII-5 is for cohort 4 on the vocabulary scale.

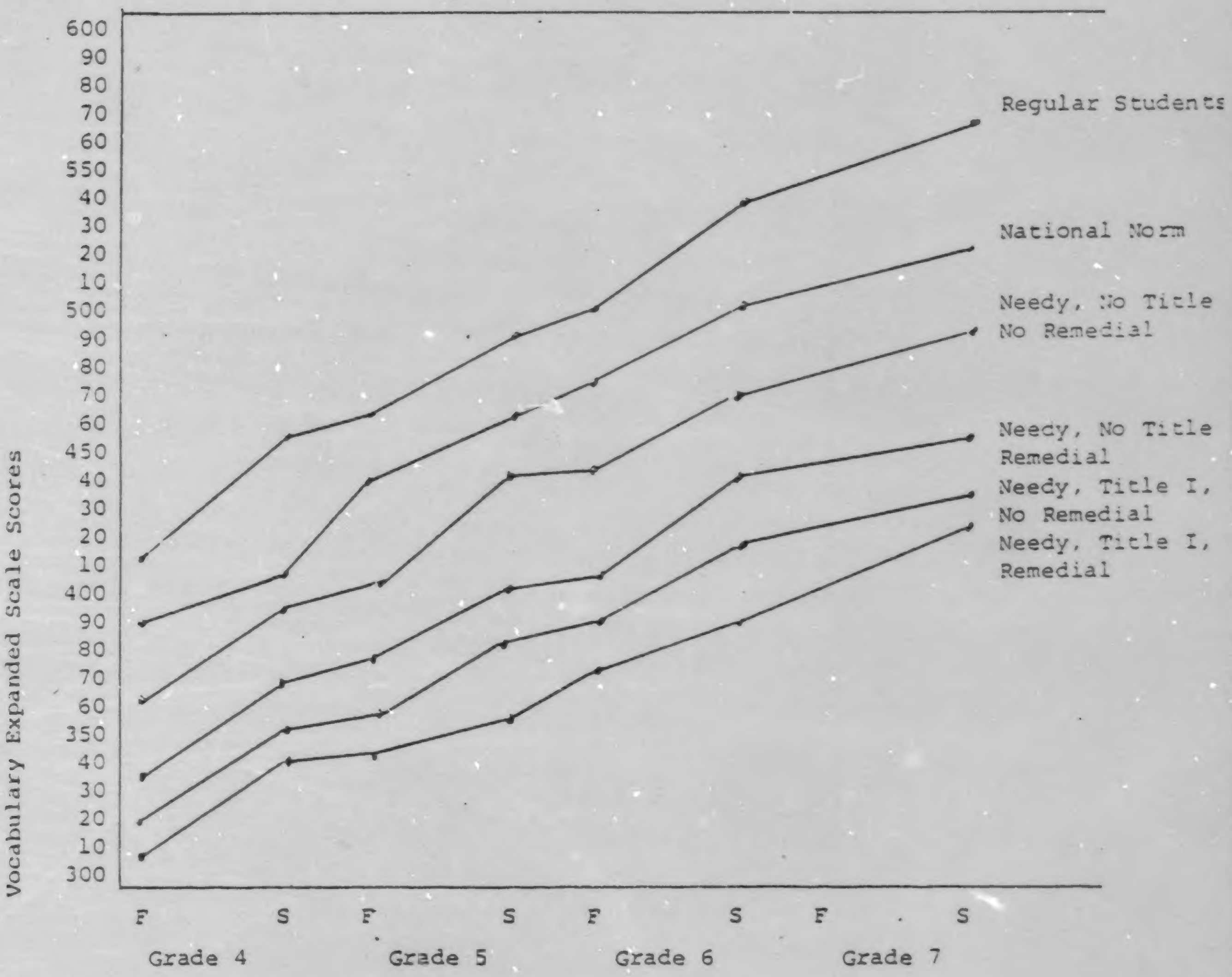

Figure VII-5. Growth Curves in Vocabulary

Source: Report 17, Table A-1

The figure provides some interesting information about the nature of the sample of students from high-poverty elementary schools. We can see that these schools have a group of students that starts above the national norm and stays above it into junior high school. These students are frequently overlooked in public discussions of poverty schools. They are good students and remain that way. The four groups initially judged by their teachers to need CE, on the other hand, start off considerably below the national norm and never catch up to it. Inspection of the levels and slopes of the lines indicate that the Title I participants start at a very low level of achievement and end up in the same low position, although they do grow at the same rate as the other students. The curves shown are really quite remarkable in their regularity, with the Title I students on the bottom, the needy but not Title I groups next, and the regular students above the national norm. Also within each group those taking remedial courses are below those not taking such courses. Other curves could have been drawn for the students who were judged by their teachers not to need CE and who either did or did not have Title I or did or did not have remedial high school courses. But these curves would have only confused the figure and they would simply confirm what is already shown. These findings speak well for the operation of the schools in terms of their selection of students for CE and for the proper assignment of remedial instruction. Also it should again be noted that while the Title I students start at the bottom and remain there, they nevertheless grow at about the same rate as the other groups.

From Figure VII-5 and the similar graphs in Report 17 it is possible to judge the effectiveness of remedial coursework. One can compare the achievement scores of similar students who took remedial coursework with those who did not. It will be seen that the slope of the curves during the junior high school years for those who took remedial coursework, when compared with those who did not take such work, is about the same. There is no evidence that remedial coursework was effective in improving the performance of those who took it when compared to the performance of those who did not take it. Thus, we cannot recommend that the way to improve the performance of disadvantaged students at the secondary level is to increase the amount of remedial coursework, at least as it is now offered.

An Analysis of School Effects and Student Background on Achievement. It will be remembered that at the beginning of this section we presented several policy questions and also pointed out the different variables on which information had been collected. By analyzing these variables through a regression model we were able to answer the policy questions. In Report 17 there are a large number of different analyses made in terms of the three different cohorts, the four test scales, and different ways of defining achievement outcomes. To simplify the presentation only one of the models will be shown here. Figure VII-6 shows a model for cohort 4 with final 7th grade achievement in vocabulary as the criterion of successful instruction.

Several things are immediately apparent. Student background is the only variable positively related to 7th grade vocabulary achievement. (The numbers in Figure VII-6 are the standardized regression coefficients). The other coefficients are all negative and some of them significantly negative. This is what we would expect because we know that for the whole school populations that level of achievement is negatively related to both receipt of Title I and intensity of instruction, as well as to a high proportion of remedial to regular courses. It should also be noted that the student background variable makes a larger contribution than any of the other variables. This points out that the high level of achievement attained by students from advantaged backgrounds persists even into high school and is not overcome by previous schooling variables. While we should expect this outcome simply for level of achievement, the same results were obtained for achievement gain, and for relative gain, where differential growth rates were taken into account. Thus, similar results were obtained for all these different criteria of achievement.

The initial policy questions and their answers are:

1. *Are the achievement effects of Title I in the elementary grades sustained into the junior-high level?*

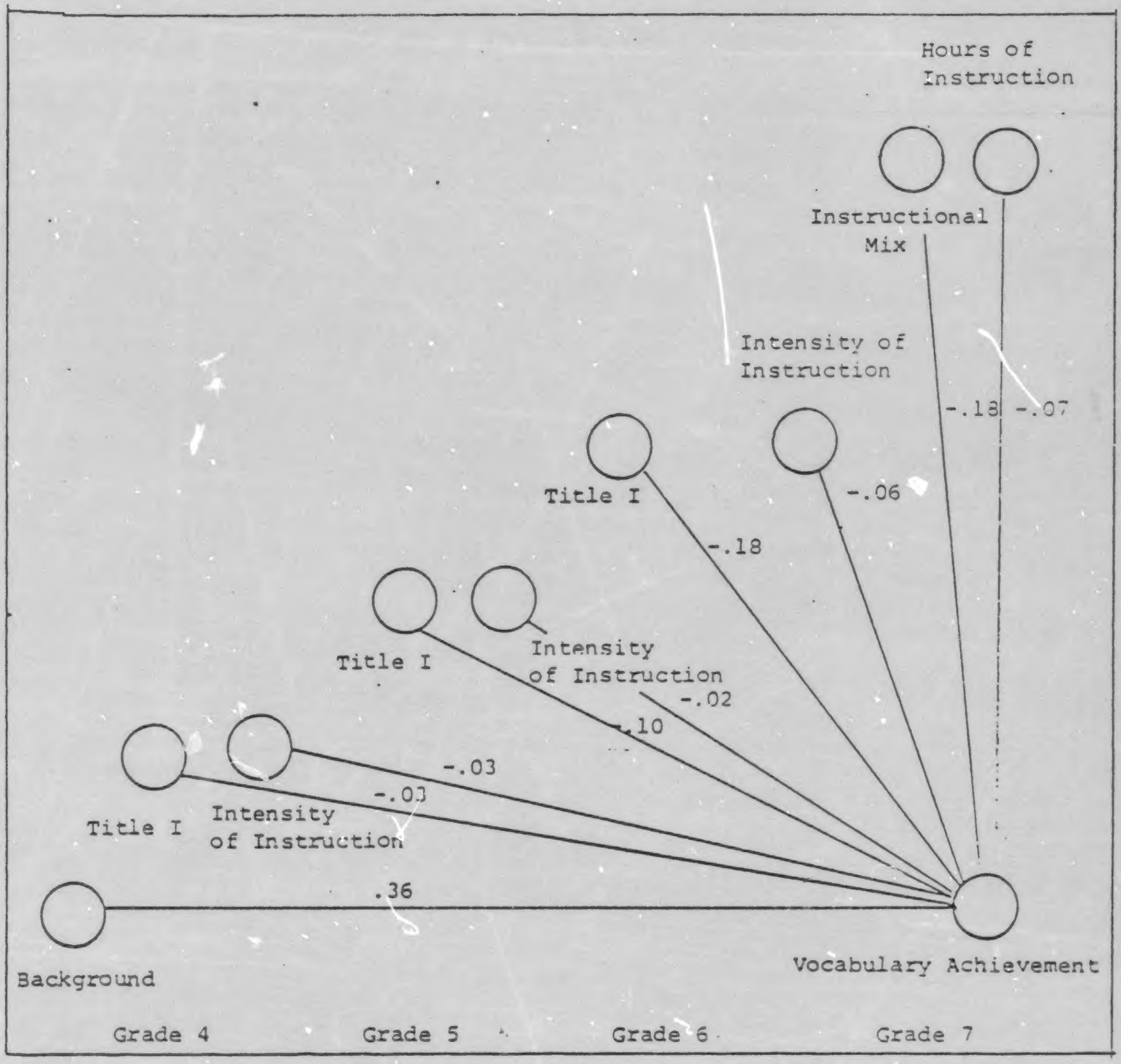
Hours of Instruction
Instructional Mix
-.18
-.07
Intensity of Instruction
Title I
-.06
-.18
Title I
Intensity of Instruction
-.02
-.10
Title I
Intensity of Instruction
-.03
-.03
.36
Background
Vocabulary Achievement
Grade 4
Grade 5
Grade 6
Grade 7

Figure VII-6. Structural Model for Assessing Effects of Title I, Intensity of Instruction, Remedial/Regular Mix, Hours of Introduction, and Student Background on Vocabulary Achievement.

Source: Report 17, Figure 4-2 and Table 4-3

The heart of this question is "long-term effects". We can define long-term effects as the sum of all gains attributable to Title I. Accordingly, four-year gains are the accumulation of immediate and delayed effects of Title I and other school experiences. Four-year effects should be the most apparent because the immediate and delayed effects are accumulated, and because in these analyses we measure the longest term of exposure to educational services. However, when the definition of "long-term" emphasizes the sustained effects of Title I, two perspectives are possible. We can view the sustained effects as just delayed effects, and examine them in the delayed-gains analyses. In this case, the immediate effects of Title I are excluded, leaving only gains sustained after participation in Title I has been suspended. Alternatively, the long-term effects of Title I can be seen as the effect noticeable on the final outcome measured at the end of the study. Both of these possibilities were dealt with in our analyses. Additionally, we were able to address the different conceptions in terms of relative gains. Thus, our five criteria cover a wide range of interpretations of "long-term" effects. Our analyses do not indicate that Title I or instructional services at the elementary level have long-term effects, either immediate or delayed.

We also have three cohorts that allowed us to compare effects between them with respect to grade in which services may be more effective. Finally, we have four subtests that we used to pinpoint particularly effective facets of Title I. Unfortunately, differences between cohorts and between subtests were not found to be systematic, so we cannot draw any generalized conclusions regarding grades in which services are particularly effective or subjects that are particularly affected.

We described intensity of instructional services as a natural function of schooling and schools' assistance to low achievers. We also described it as a possible alternative measure of Title I participation, because intensification of instruction is the main force of Title I. The results indicated that the two were closely related, but that each should be allowed to play its role in our models.

2. *What effect do secondary-school courses have on achievement of former Title I participants?*

The focus is on former Title I participants, but discerning which students truly are former participants is problematic. Although we have indicators of participation in grades four through six, we do not have them for earlier grades. The mix of courses taken in the secondary years was combined with participation in each of the elementary years to create interaction terms for testing. These interactions generally made very small contributions to the prediction of the achievement criteria, indicating that the Larson and Dittman (19) suggestion of the possible value of increased remedial services at the secondary school level was not substantiated. However, the larger question to be answered is whether high concentrations of remedial classes help the achievement of anyone, especially those once participating in Title I. We found no evidence that secondary courses have effects, but we could discern evidence that lower achievers (Title I participants) are more likely to take remedial courses.

3. *How does student background relate to achievement level in secondary school?*

This question addresses the effects of background, and is the most straightforward question to answer. We looked for effects of background on each of the criteria. Not only were we interested in the effect of high or low status on different facets of achievement, but the degree that this out-of-school factor dominates school factors. We found that background still plays a very important role in achievement, even as students move through the junior-high grades. This finding indicates that poor students are not particularly more receptive to instruction in later grades, nor in specific subjects.

CHAPTER VIII. WHAT HAPPENS TO STUDENT ACHIEVEMENT OVER THE SUMMER, AND IS SUMMER SCHOOL EFFECTIVE?

Summary

This chapter examines two questions. The first concerns the amount of achievement loss or gain over the summer. The second bears on the effectiveness of summer school. The results are:

- *There are quite large reading gains over the summer. There are both math gains and losses over the summer. Particularly in the higher grades there may be losses.*
- *In comparing CE students with regular students, there may be a very slight summer gain for CE students in reading, but not in math. The differences are so small that they have no practical significance.*
- *The relative changes of high achievers and high gainers were examined. The results of compounded by regression effects, but show that high gainers tend to lose over the summer but low gainers tend to gain over the summer. Such changes as may exist do not seem to justify special summer programs.*
- *In comparing the achievement gains of students who attended summer school with those who did not attend, no differences were found. It is emphasized that there is relatively little instruction in reading or math during summer school and that gains probably should not be expected.*

INTRODUCTION

All groups of students show achievement growth during the regular school year, but what happens to that growth over the summer? To what extent do students continue to grow academically even though they receive no formal instruction? We have already seen in Chapter V that during the regular school year the rate of growth for CE students is sometimes less than it is for regular students. It has been suggested that during the summer, regular students continue to improve their achievements due to informal learning experiences, but that CE students lack both the motivation and resources to engage in these informal learning activities. However, the evidence is less than clear-cut. As will be discussed later, some have argued that, for all students, achievement suffers an absolute decline over the summer, while other evidence suggests that CE students suffer a loss relative to regular students. It has been further suggested that, among CE students, those who achieve the highest gains during the regular school year suffer the sharpest losses during the summer.

Based on these ideas, it has been suggested that summer school has an unusually important role to play. It has been argued that some CE students have regular school-year learning experiences that enable them to achieve exceptionally high gains, and that it is important that efforts be made to continue this high rate of achievement, summer school seeming like a reasonable way of doing it. Since summer school classes are available to only about half of all students, it has been argued that their availability should be increased, particularly for CE students.

The remainder of this chapter examines these ideas. First, we will discuss the extent to which there is a "summer drop-off" and then we will consider the availability and effectiveness of summer school.

THE NATURE OF ACHIEVEMENT GROWTH OVER THE SUMMER

In a 1972 review of the effectiveness of summer compensatory education, Austin, Rogers and Walbesser (1) conclude that students participating in CE summer programs show "modest achievement gains." However, they point out that the studies reviewed generally had no control groups, and it is possible that "maturation" could account for the gains reported. The same review indicated that school principals and teachers believed summer school to be an effective learning experience. However, starting in 1976 the Stanford Research Institute's (SRI) Educational Policy Research Center issued a series of reports that raised questions about whether or not there was any maturation over the summer and whether or not there were comparable growth changes for regular and CE students. Their studies were done within the context of studying the proper period for evaluating CE programs. It was argued that evaluations based on fall-to-spring achievement gains were less than adequate because there were significant changes during the summer. Thus CE students who showed impressive gains during the fall-to-spring time period might lose much of the gain during the summer. If this were the case, it was argued, then the proper period for evaluation was from the fall of one year to the fall of the next year.

The series of SRI reports raised serious questions that influenced policy regarding whether the federal government was appropriately evaluating its CE-funded programs, as well as whether it should support efforts to increase federal funds available to summer programs. In light of the significant impact the SRI results were having, it was important to examine the SES data base relative to summer achievement change.

Is There an Absolute Summer Loss?

As we have already discussed, it was generally assumed that there should be some relatively modest gains over the summer. Test publishers assume a one-month summer growth, and the literature generally supported a summer gain. Thomas and Pelavin (30) say, "However, existing research suggests that the disadvantaged student has no gain or a one-month loss over the summer". It was suggested that CE students were given particularly intensive instruction during the regular school year and thus showed very significant growth. But this growth was thought to be ephemeral and much of it was lost during the summer. Thus CE students who had gained more than regular students during the regular school year lost more than regular students during the summer, and ended up the following fall further behind the regular students than they had been the previous fall. However, the 1976 SRI report was based on a compilation of state ESEA Title I evaluation reports and the data were admittedly less than satisfactory.

In 1977 Pelavin and David (25) published a report based on longitudinal data. They obtained data from a midwestern city, known as "City M," which had fall, spring, and ensuing fall test results on the Gates-MacGinitie reading test for a moderate number of CE students. The results are shown in Table VIII-1.

Table VIII-1

"City M" Grade Equivalent Means for Reading for Students with at Least Three Consecutive Test Points*

Grade	N	Fall	Spring	Fall
3	272	2.23	3.29	2.78
4	931	2.65	3.58	3.18
5	980	3.23	4.30	4.01
6	316	3.84	4.78	4.42
7	128	4.35	5.25	4.95

*Adapted from Pelavin and David (25), Table 1.

Similar results were available for two successive years. While the number of cases shrank considerably, the results were similar: each fall grade-equivalent means was considerably below the mean for the preceding spring. They also report results for two California junior high schools participating in the Demonstration Programs in Intensive Instruction. The number of cases is quite small (from 47 to 153) and the results are reported in (often misleading) grade equivalents. Again, students were followed longitudinally for two years. Of six comparisons for reading, five showed summer losses and one a gain; for math, five showed losses and one no change. From these results they believe that ". . . achievement gains made during the school year are not sustained, even until the next fall", and say:

> "In conclusion, we urge that districts administer achievement tests minimally each fall and preferably each fall and spring. These data would provide the capability for estimating the extent to which school year gains are sustained through the following summer. Both fall and spring tests have added advantage of allowing a separation of school-year and summer achievement. Although this information is not critical for estimates of annual gains, it is valuable for studying the extent and causes of summer losses. If, for example, the phenomenon is a function of the measures used, the standardized achievement tests, one would want to change the measures not the program. If it is a result of instructional techniques that mitigate against retention, then the techniques should be changed. Since there are no simple solutions (for example, there is little research to support the notion that summer

school would alleviate the summer losses), it is important to be able to determine why the losses occur in order to develop appropriate remedies."

These results received wide attention in the government and became known as the "summer drop-off phenomena." There are a number of reservations that can be made about the studies. They are discussed in Report 8.

In view of the somewhat unexpected results from the SRI study, others have investigated the summer drop-off phenomena. Recently, Hammond and Frechtling (10) reported on the results from a special study of the NIE Instructional Dimensions Study. Their results are shown in Table VIII-2.

Table VIII-2

Grade Equivalent Mean Achievement Gain Scores for CE Students*

Reading	N	Fall-to-Spring Gains	Spring-to-Fall Gains	Fall-to Fall Gains
Grade 1	395	1.2	0.0	1.2
Grade 3	565	0.7	0.2	0.9
Math				
Grade 1	143	1.0	0.1	1.1
Grade 3	314	1.2	0.0	1.2

*Adapted from Hammond and Frechtling (10), Table 1.

These results show no summer losses, and show summer gains in two of the four comparisons. Clearly these results are in contrast to the Pelavin and David findings of summer loss. Again, however, the results are based on a moderate number of cases, although it is said that the sample was representative of the original sample, which was ". . . purposively selected for their instructional features." The authors point out that the sample cannot be considered representative of Title I reading and math programs.

Heyns (12) studied summer school achievement changes in Atlanta, Georgia. She reports that Atlanta has a particularly vigorous summer school program. As a part of the study she analyzed data collected by the Atlanta school system, which is relevant to the summer loss question. Table VIII-3 shows typical results.

Table VIII-3

Mean Raw Scores in Basic Subjects by Test Dates and Subject Subtest.*
(N = 739, 7th Grade)

Subject Subtest:	Date of Test Fall 1970	 Spring 1971	 Fall 1971
1. Word knowledge	17.3	21.9	22.8
2. Reading	15.3	17.5	18.0
3. Language	35.6	39.7	41.3
4. Language Study Skills	9.4	11.6	12.2
5. Arithmetic Computation	12.7	17.4	17.2
6. Arithmetic Problem Solving	15.6	18.8	19.5

*Adapted from Heyns' Table 2.3

The table shows that there are gains over the summer in all of the reading-related subtests. In the math area there is a small loss in one subtest and a larger gain in the other. Heyns presents data from several other grades which show similar results. These data have the advantage of being based on raw scores and thus there is no scaling problem. They have the disadvantage of involving only a small number of all Atlanta students and represent only one city. Nevertheless, they do not show the marked summer loss reported by SRI.

SES Report 8 contains data relevant to this issue. While the sample is not precisely representative of the nation's schools, it is close to a representative sample and includes large numbers of both regular and CE students. Figures 10-1 and 10-2 show the longitudinal achievement scores for a group of about 39,000 students for the fall of 1976, the spring of 1977, and the fall of 1977. The number of students ranges from 7,133 to 8,412 per cohort. One can see rates of growth during the regular school year and also see the levels of achievement in the subsequent fall.* Figure VIII-1 shows that, in reading, students continue to grow over the summer and, for the higher grades, at a rate that approximates the growth during the regular school year. The figure further shows that in reading there is an absolute gain over the summer. Figure VIII-2, show the results for math. However, the comparison of changes as shown in Figure VIII-2, are quite different than for reading; on the average, math scores show only smaller gains over the summer--gains in four comparisons and a loss in one comparison. A possible explanation is that students get much more opportunity to practice reading in their everyday lives than they do to practice math. This is particularly true in the higher grades, and thus the rate of gain in reading during the summer approximates the rate for the regular school year. Finally, it seems clear that in these data there is not an absolute summer drop-off, instead, there is an overall gain. The data from the SES are of much higher quality than those available to Pelavin and David, and as mentioned, their data have a number of potential deficiencies. In contrast, the SES data were specifically collected for the study, were administered under known, controlled conditions, were based on large numbers of quite representative students, and the vertical scale scores are based on fall and spring testing points. In view of the results obtained, and their congruence with the NIE and Heyns data, we believe there is an absolute reading gain over the summer, and that there is a similar, but smaller, absolute gain in math.

Is There a Relative Summer Loss?

Next it was suggested that there was a relative loss, namely that CE students showed more of an achievement loss than regular students. David and Pelavin (7) suggest this is the case and say (p. 4):

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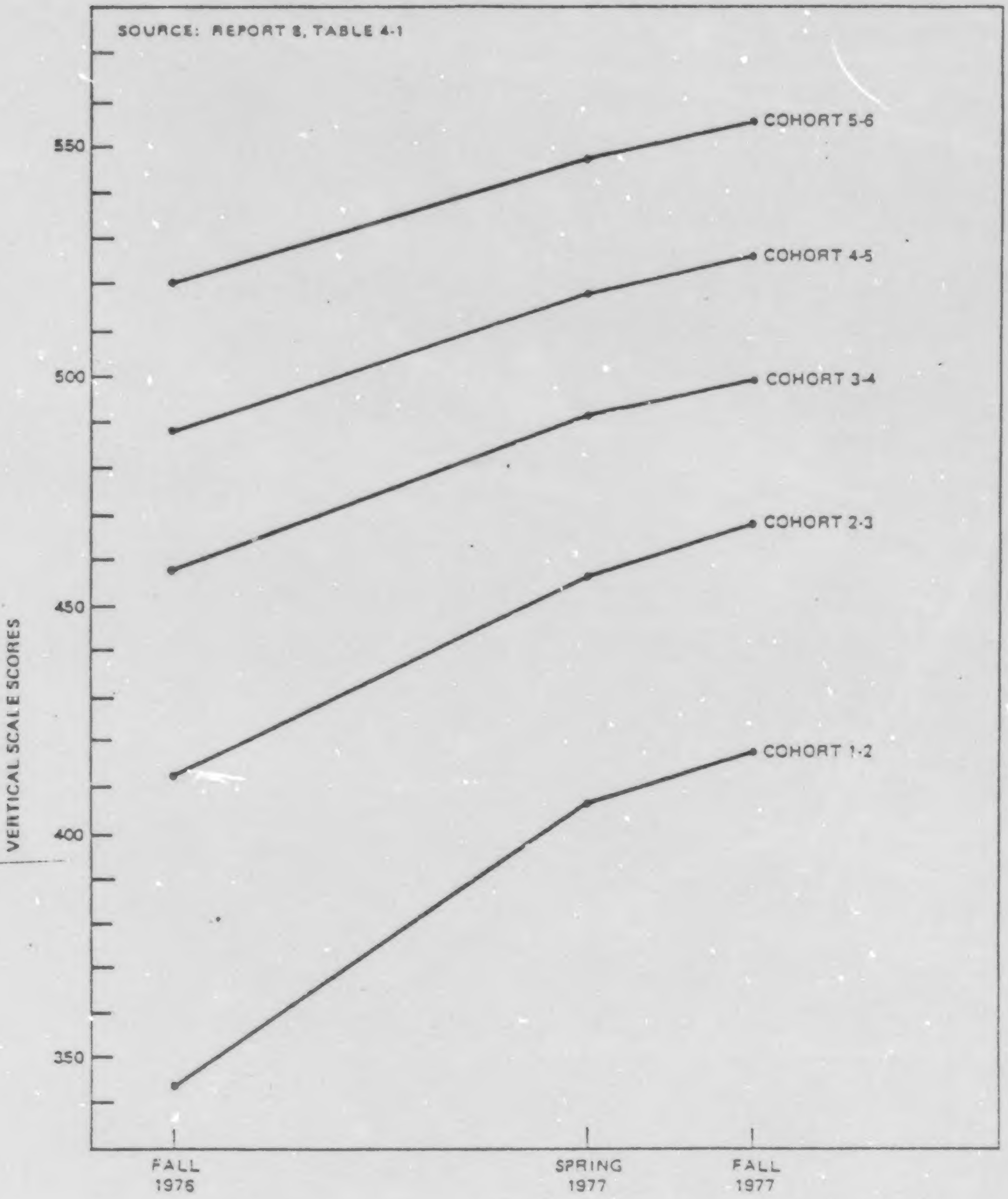
*Strictly, these scores are not for the "summer." Tests were administered about four weeks before school ended and about 3 weeks after it started. Report #8 discusses what implications this may have, but it should be noted that this same characteristic is true of all the data reported by Pelavin and David, by Hammond and Frechtling, and by Heyns.



SOURCE: REPORT 8, TABLE 4-1

Figure VIII-1. Reading Achievement Scores

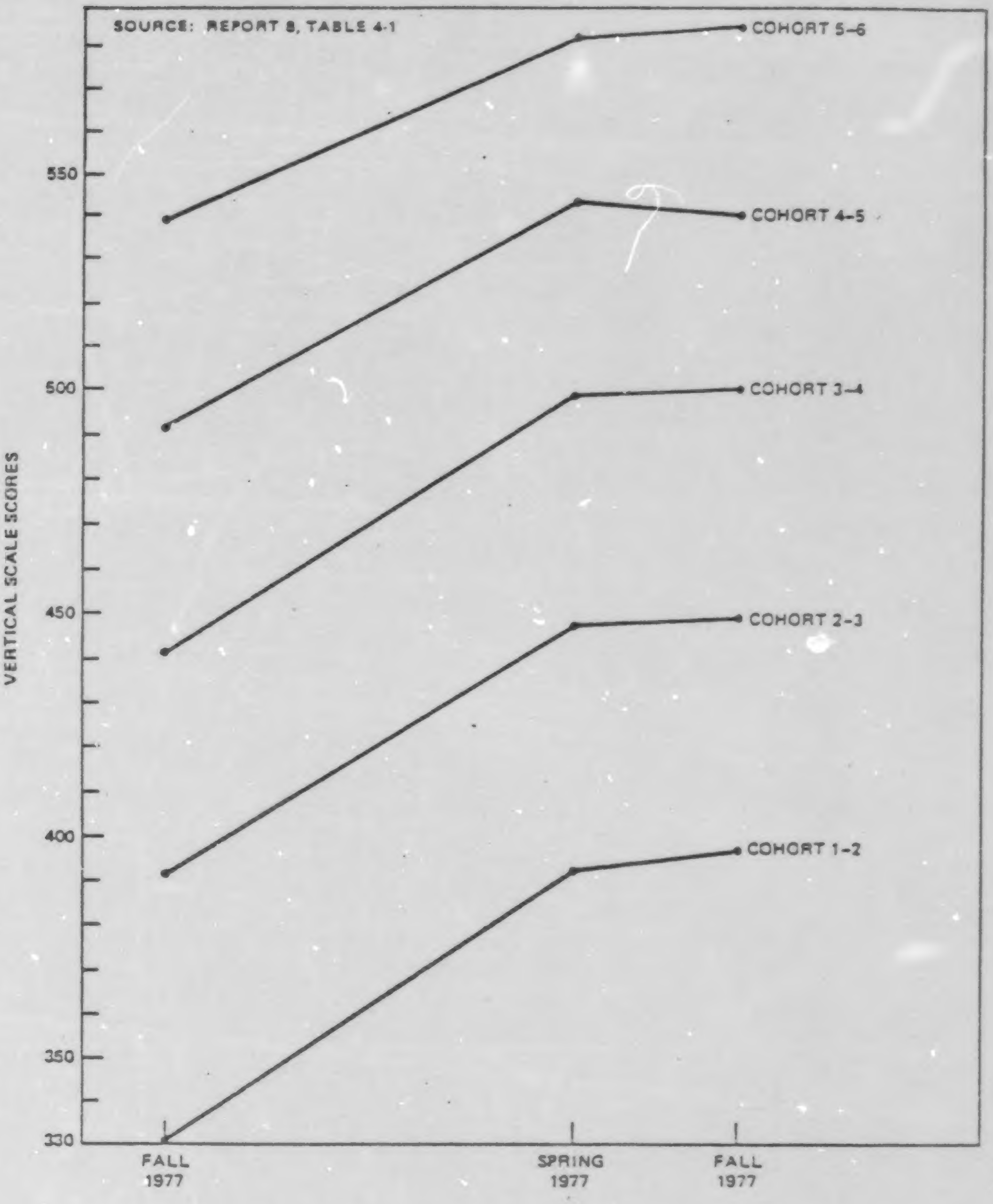


Figure VIII-2. Math Achievement Scores

> "These studies, while extremely limited, present some evidence tha disadvantaged students achieve at a slower rate than expected over the summer. Both conventional wisdom and the standardization procedure of achievement tests assume that the rate of achievement for all students is slower during the summer than during the school year... This pattern of achievement is presumed to be the same for both advantaged and disadvantaged students: all students are assumed to gain over the summer but at a slower rate than over the school year. The studies cited above suggest that this is not the case for disadvantaged students. In fact, disadvantaged students may have no gain over the summer or may even lose."

They then review their previous work and say, "Together, these findings suggest that large achievement gains produced by compensatory-education programs over the school year may be followed by corresponding achievement losses over the summer." David and Pelavin reexamine the data they reported previously and also include new data from the Alum Rock Voucher Study. The Alum Rock reading results show summer gains for three grades and no change for four grades. They conclude by saying, "Combined with questions raised by previous research, such as inconsistencies between school-year evaluation results and the results of annual state-wide testing programs, we suspect that the existence of summer losses is quite common for educationally disadvantaged students."

Again the NIE data are relevant. Table VIII-4 shows data for students who were above the 50th percentile and not recieving CE, and students who were below the 50th percentile and receiving CE.

Regarding these results, Hammond and Frechtling say: "When CE students whose pretest scores fall below the fiftieth percentile were compared to non-CE students whose pretest scores were at or above the fiftieth percentile, the low achievers lost ground over the summer to the high achievers. The difference was statistically signficant, however, only for the first grade. On a twelve-month basis the low achievers maintained their position relative to the high achievers because the CE students had higher rates of gain during the school year." There are several puzzling things about these data--particularly the wide variation in gains. It seems peculiar that non-CE first graders gained only 0.5 grade equivalents in both reading and math during the school year;

Table VIII-4

Mean Grade Equivalent Scores for Non-CE Students Above the 50th Percentile and CE Students Below the 50th Percentile*

Reading	N	Fall-to-Spring Gains	Spring-to-Fall Gains	Fall-to-Fall Gains
Grade 1				
Non-CE Students	296	0.5	0.1	0.6
CE Students	344	1.2	0.0	1.2
Grade 3				
Non-CE Students	305	1.0	0.6	1.6
CE Students	512	0.5	0.3	0.8
Math				
Grade 1				
Non-CE Students	435	0.5	0.1	0.6
CE Students	97	1.1	0.1	1.2
Grade 3				
Non-CE Students	178	1.6	0.2	1.8
CE Students	306	1.2	0.1	1.1

*Adapted from Hammond and Frechtling, Table 2.

similarly, why did the 3rd-grade CE reading students gain only 0.5 grade equivalents in reading but 1.2 grade equivalents in math? We believe that these data are equivocal regarding the existence of a relative summer loss for CE students.

The SES has extensive data on this problem. We can use the same data as presented before on the absolute summer drop-off question, but break it into two groups--those receiving CE and those not receiving CE. Figures VIII-3 and

VIII-4 show the results for reading and for math. The number of cases for reading varies from 1,477 to 2,344 for CE students and from 5,400 to 6,131 for non-CE students. The corresponding numbers for math are 1,115 to 1,499 and 6,132 to 7,061. It will be noted that for the non-CE students in reading there is a lessening in the rates of growth over the summer for the lower grade cohorts but very little, if any, for the higher grades. For the CE students there is a similar lessening in the lower grades, but, considering their slightly slower rates of growth during the regular school year, there may be a slight summer gain relative to non-CE students. In the higher grades the CE students in reading drop off slightly more than their non-CE peers. For math the picture is somewhat different. Both the CE and non-CE students show a lessening in rates of growth over the summer for all grade cohorts. The change for CE and non-CE students is very similar with, perhaps, a slightly larger drop for the non-CE students. Since the graphs have a number of overlapping lines and many may be difficult to follow, the same results are shown numerically in Table VIII-5.

Report 8 is based on data from the first and second year of the study. To complete the picture a special tabulation was made on data from all three years. With these data we are able to examine the changes during two successive summers. Figures VIII-5 and VIII-6 show the results over all three years and are broken down for Regular students, Needy Regular students, and CE students. Figure VIII-5 shows the results for reading and it will be seen that they are very similar to those shown previously. In this figure the results for Cohorts 1, 2, 3, and 4 are shown which means that all grades from 1 through 7 are included. Again it will be seen that there are significant gains during all three school years for all cohorts and all types of students. Over each summer there continue to be gains in the vast majority of cases; in fact, for 23 of 24 curves shown there are summer reading gains. Summer gains tend to be greater in the higher cohorts and there may be a slightly smaller gain in the Needy and CE students than in the Regular students, but any difference is exceedingly small and of no practical significance. Figure VIII-6 shows similar results for math. Again we see that during the school year there are large advances for all cohorts and all types of students. There is no marked difference in the losses of the

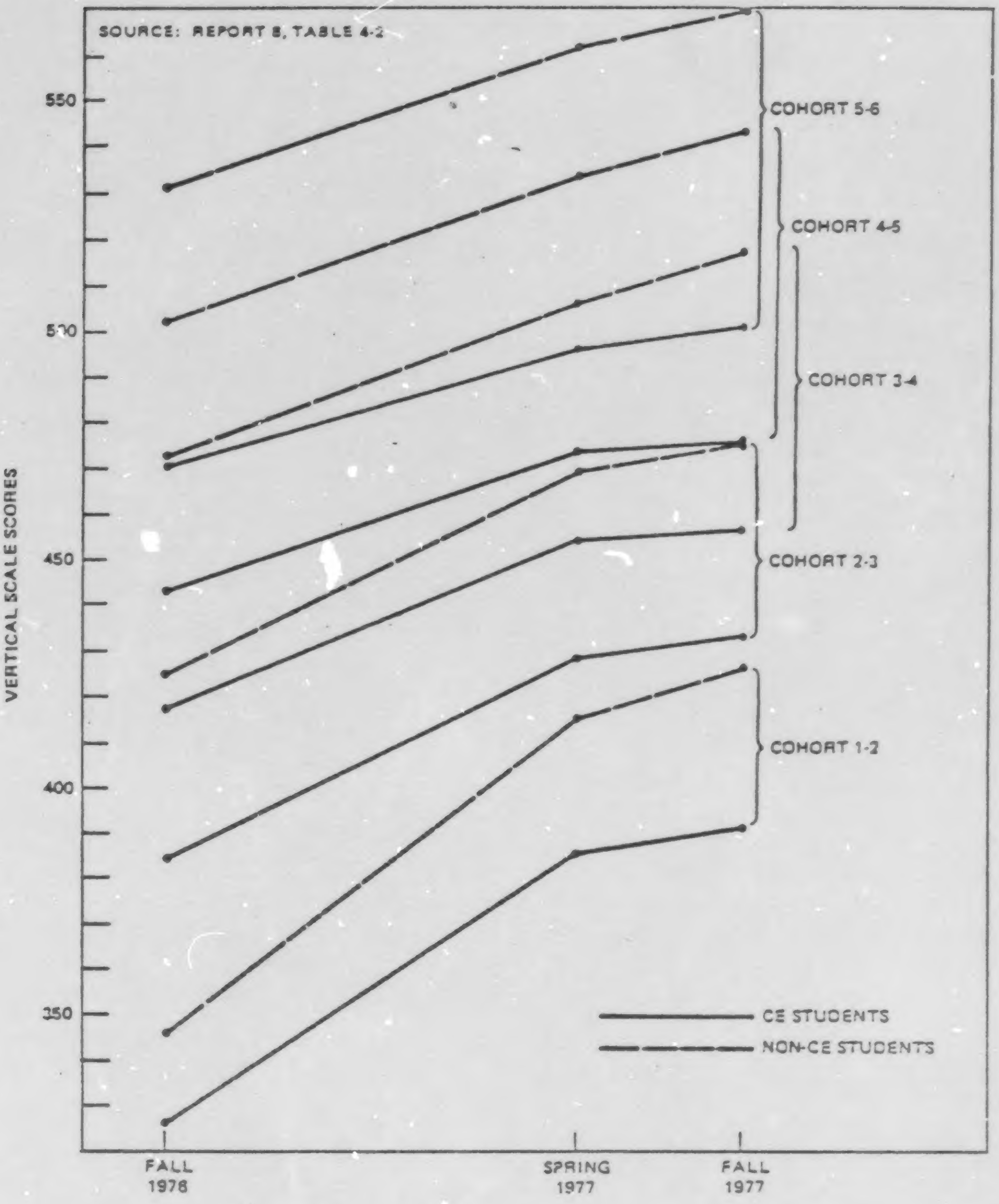


Figure VIII-3. Reading Achievement Scores for CE and Non-CE Students

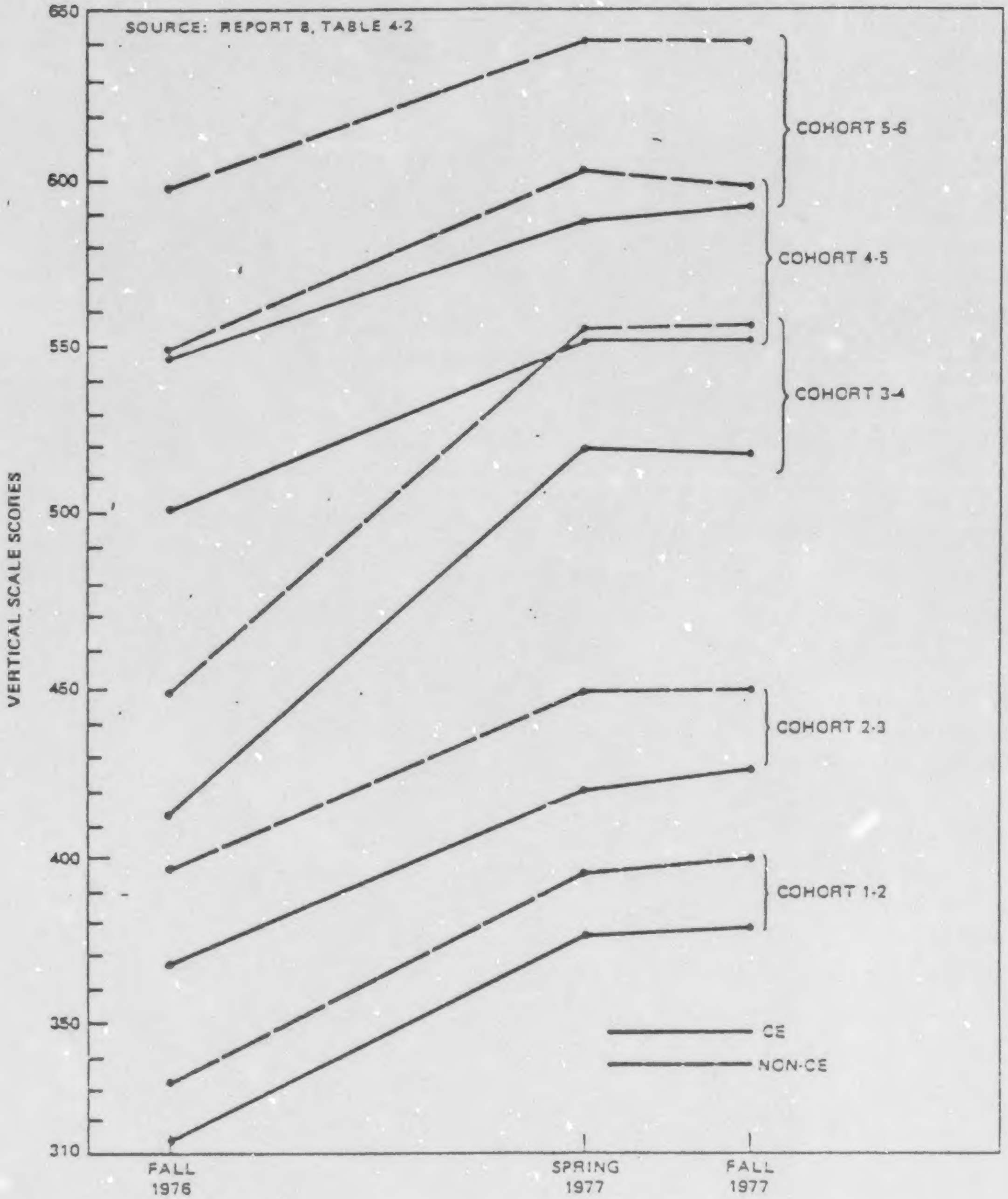


Figure VIII-4. Math Achievement Scores for CE and Non-CE Students

Table VIII-5

Summer Gain Scores for CE and Non-CE Students.
(Vertical Scale Scores)

Cohort CE Status	Spring 1977	Fall 1978	Summer Change
	Reading		
Cohort 1-2			
CE	385	391	6
Non-CE	416	427	11
Cohort 2-3			
CE	428	433	5
Non-CE	468	476	8
Cohort 3-4			
CE	455	456	1
Non-CE	507	518	11
Cohort 4-5			
CE	474	477	3
Non-CE	534	543	9
Cohort 5-6			
CE	497	501	4
Non-CE	561	571	10
	Math		
Cohort 1-2			
CE	376	377	1
Non-CE	395	400	5
Cohort 2-3			
CE	421	426	5
Non-CE	451	451	0
Cohort 3-4			
CE	469	468	-1
Non-CE	505	506	1
Cohort 4-5			
CE	502	501	-1
Non-CE	552	547	-5
Cohort 5-6			
CE	539	543	4
Non-CE	591	592	1

Source: Report 8, Table 4-2

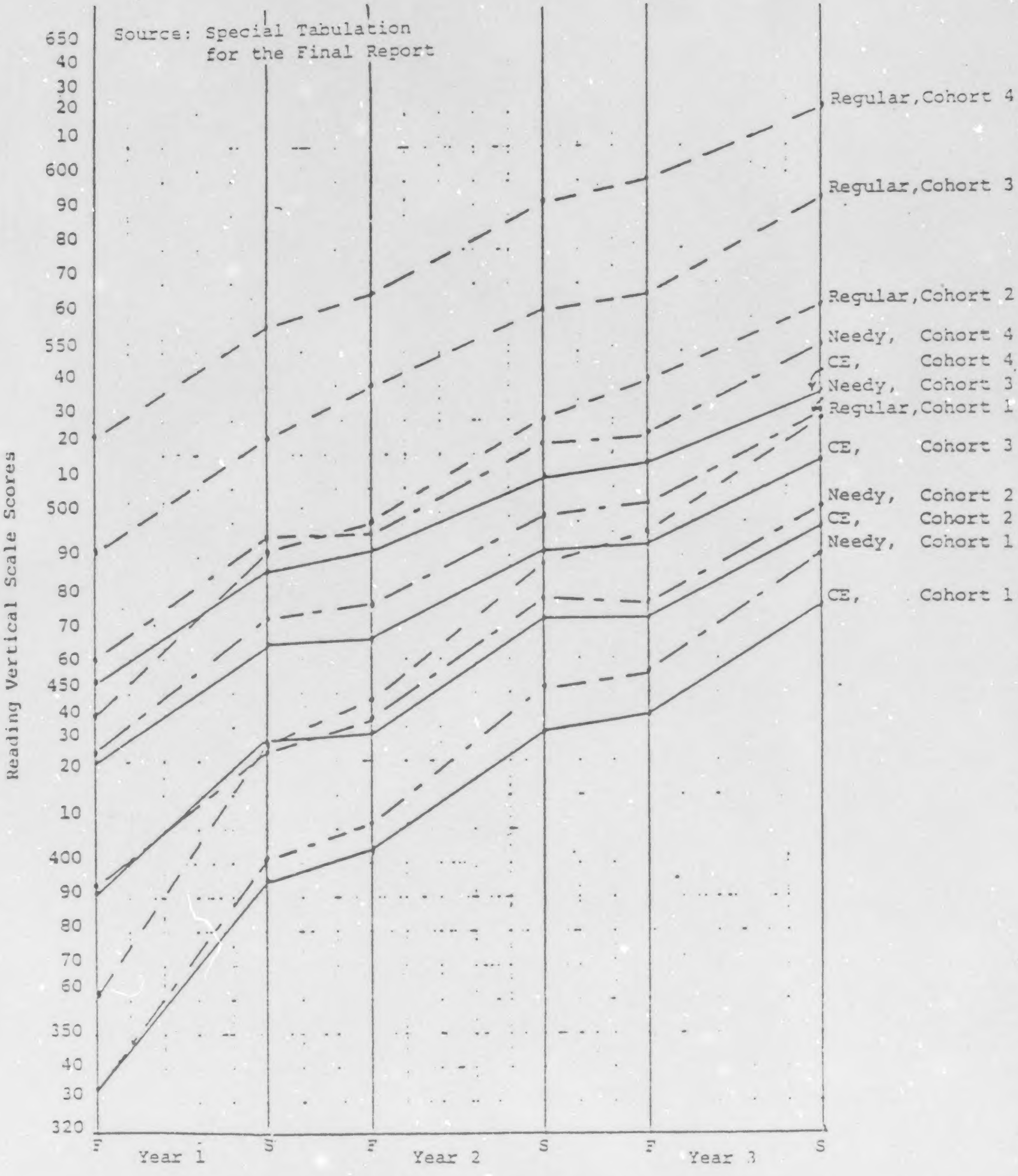
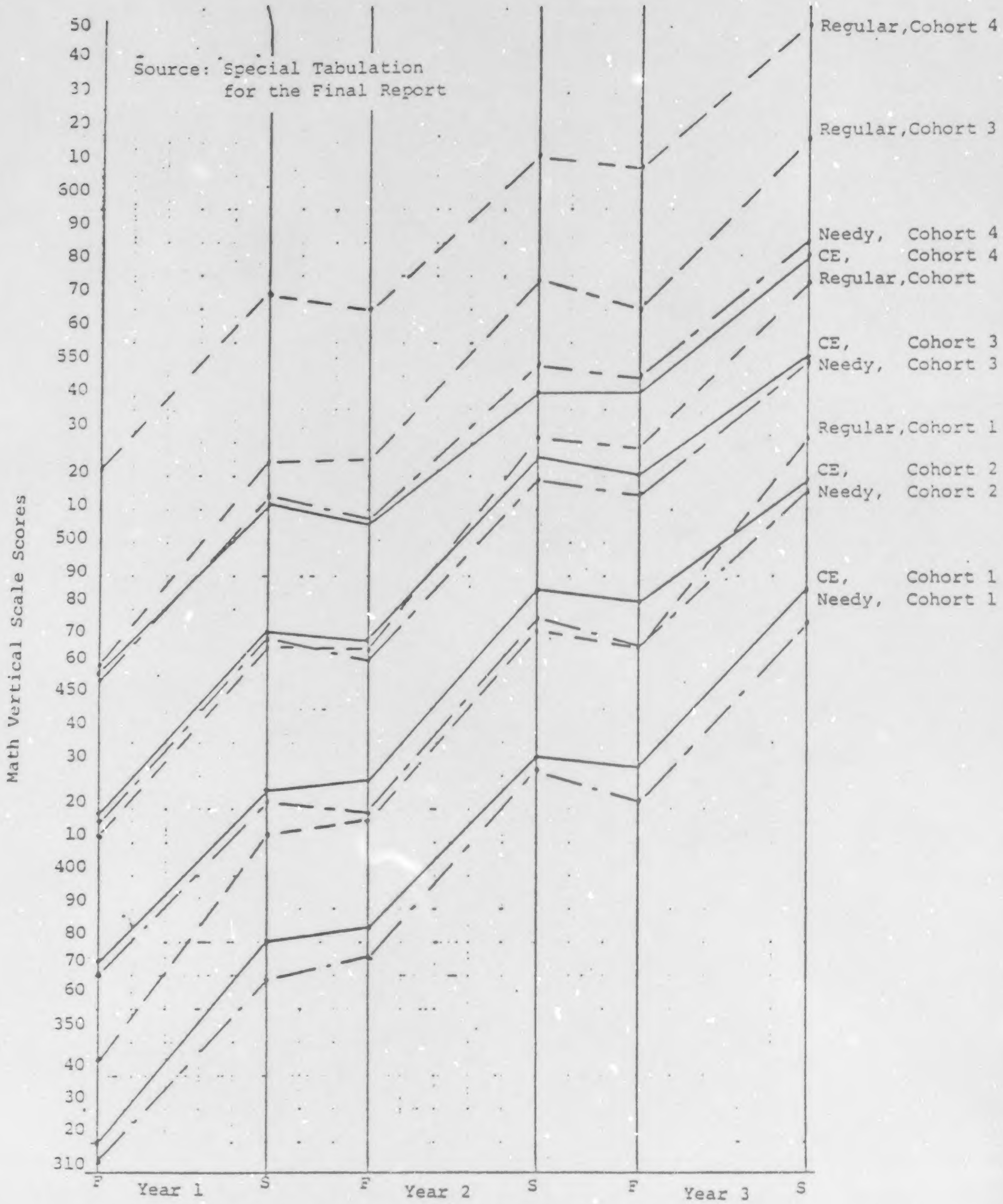


Figure VIII-5. Reading Vertical Scale Scores for Regular, Needy and CE Student



Source: Special Tabulation
for the Final Report

Figure VIII-6. Math Vertical Scale Scores for Regular Needy and CE Students

CE students and the other students, although the losses for the higher grades seem to be more marked than for the lower grades. This finding is consistent with the idea that in the higher grades more advanced math material is being taught and this material is not the kind that would be practiced in students' everyday summer activities. Indeed the results for both reading and math are congruent with the notion that the students show summer losses or gains as a function of the activities they engage in during the summer. Over the summer there is considerable opportunity for children to engage in reading activities, particularly for the older children who have become accustomed to reading from books. On the other hand students have little occasion to practice math over the summer and particularly the more advanced math taught in the higher grades and thus we see the larger losses in math among the older students.

In evaluating these summer changes, it should be remembered that the standard error of a vertical scale score is about 50. It is our position that relative to Regular students there may be a very slight, overall summer drop for CE students in reading, but not in math. Because of the very large number of cases involved in each comparison it is possible to show a few statistically significant changes, but from a practical point of view the data do not support the idea of any important loss for CE students relative to their non-CE peers. Neither the SES data nor the NIE data give credence to any large or particularly significant relative summer loss.

Over the Summer, Do High Achievers Lose More than Low Achievers?

It has also been suggested that CE students who are high achievers are the ones who lose the most during the summer. Achievement is defined here as the achievement level of the student, not the gain during the school year--which will be considered in the next section. It is thought by some that students with good academic potential profit from the increased services afforded by CE instruction, but that during the summer they are again placed in an impoverished intellectual environment and lose more of the school-year achievements than do non-CE students, who enjoy superior summer environments. It is further suggested that children who are low achievers gain relatively little during the regular school year, and likewise lose relatively little during the summer.

The presentation here is more complicated than in the previous graphs because for each cohort two concepts are presented simultaneously, namely, CE status and level of achievement. Level of achievement was defined as the average of the fall and spring (recommended level) test scores for the previous school year. This averaging was done to achieve as much stability as possible in specifying the level of achievement for each child. The graphs show the results for the first quartile, that is, the quarter of students having the lowest achievement test scores, and for the third quartile. The third quartile was selected rather than the fourth quartile for two reasons. First, the number of cases of CE students in the fourth quartile, by grade cohort, became quite small and the results were rather unstable. Second, the fourth quartile results, while unstable, were consistent with those for the third quartile where the number of cases was reasonably large (not less than 114 for the smallest cell-by-cohort, by CE status). Table VIII-6 shows the gains and losses in achievement test scores over the summer for students in the first and third achievement quartiles. Figures VIII-7 and VIII-8 are quite complicated but are included here because they show the basic growth data for the school year and the summer. A number of interesting results follow from these data:

1) For reading, the growth rate for the first quartile during the school year is quite similar for each cohort and between cohorts, and the growth continues at approximately the same rate over the summer. A portion of the measured summer growth is undoubtedly due to regression, but, surprisingly, the amount of growth and/or regression is similar for both CE and non-CE students.

2) For reading, the rate of growth of third quartile students during the school year is considerably higher than that for first quartile students. There is a tendency during the

Table VIII-6

Changes in Test Scores Over the Summer for Low- and High-Achieving Students by CE Status.

Cohort	CE-Q1	Non-CE-Q1	CE-Q3	Non-CE-Q3
		Reading		
1-2	11	16	3	13
2-3	8	13	0	7
3-4	3	10	-1	13
4-5	6	11	-4	6
5-6	7	8	-3	11
		Math		
1-2	16	21	-9	0
2-3	7	7	-4	7
3-4	9	9	-9	1
4-5	9	9	-12	-9
5-6	12	15	-5	-1

Source: Report 8, Table D-1

regular school year for CE students to grow at a higher rate than non-CE students.

Over the summer, third quartile non-CE students continue to grow, while, particularly for the higher grade cohorts, the third quartile CE students show a loss. The third quartile students should show less regression toward the mean than first quartile students, but there should still be some regression for third quartile students. In spite of this, non-CE students continue to grow over

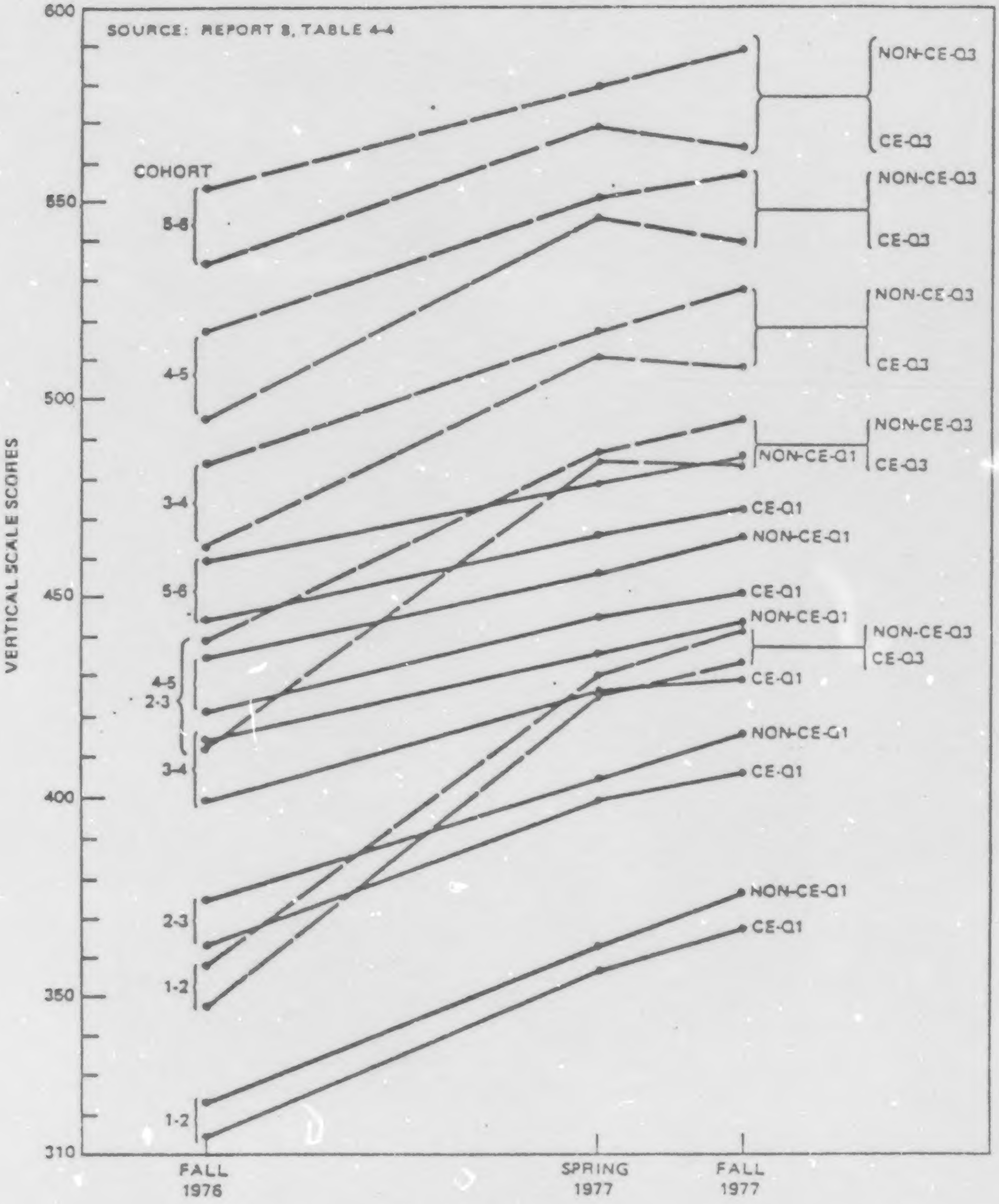


Figure VIII-7. Reading Achievement by CE Status and Quartile of Achievement Level

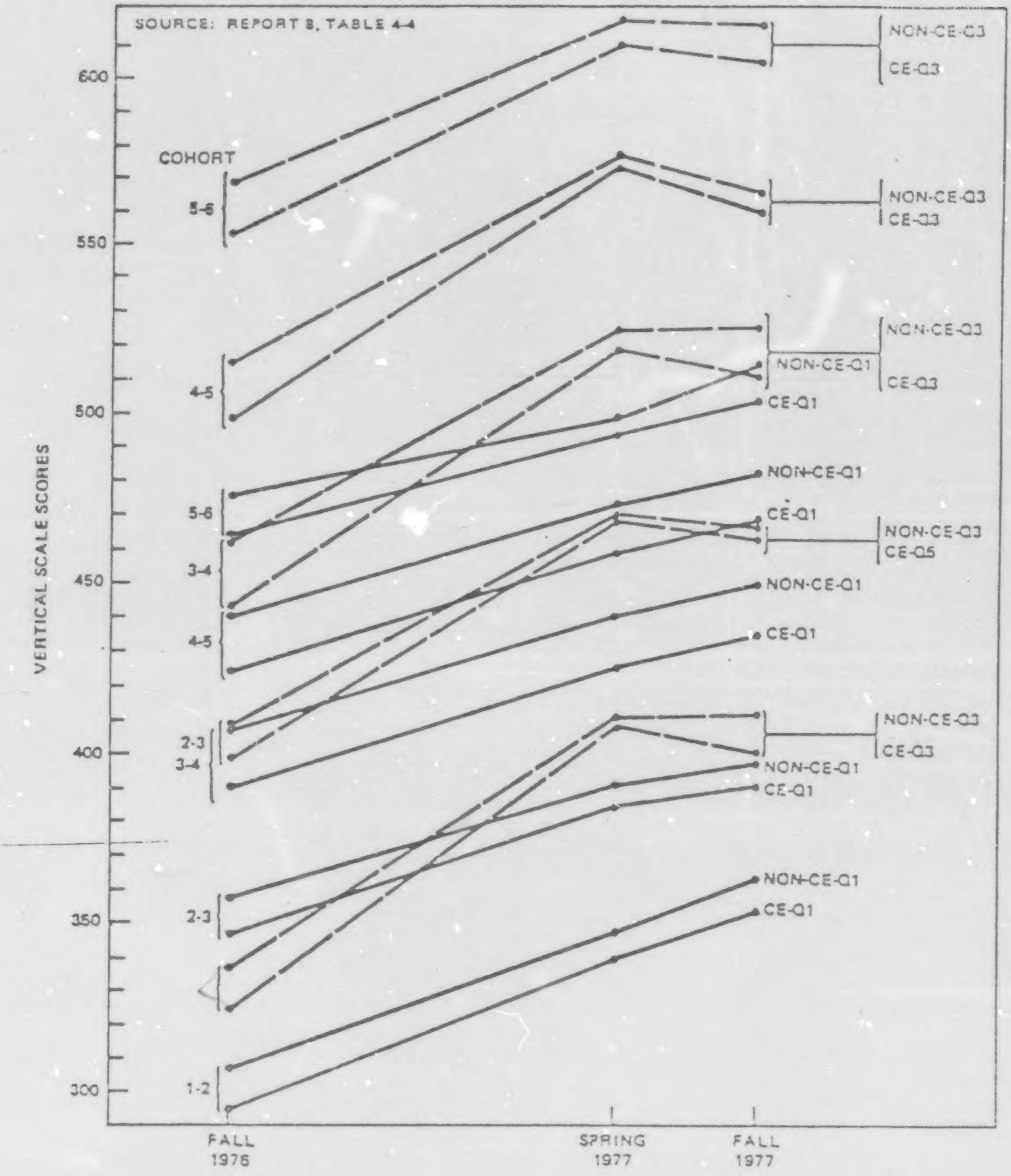


Figure VIII-8. Math Achievement by CE Status and Quartile of Achievement Level

the summer. Certainly for reading, the CE students in the third quartile show a relative loss, while the first quartile CE students do not--rather they show about the same gain as first quartile non-CE students.

3) For math, the first quartile students behave in much the same way as they do for reading; that is, they have gains over the summer at about the same rate as school year gains, and there is little difference between CE and non-CE students.

4) For math, for the third quartile students, the picture is somewhat different than it is for reading. Again the third quartile students grow at a more rapid rate during the school year than first quartile students, but both CE and non-CE math students show losses over the summer. Also, there is evidence that the CE students lose at a greater rate than the non-CE students, but the difference is not as great as for reading.

From the above we conclude that low-achieving students continue to grow over the summer and at about the same rate as during the school year, and there is no significant difference between CE and non-CE students. On the other hand, high-achieving students grow at a higher rate during the school year. For reading, non-CE high-achieving students continue to grow over the summer, but CE students show an absolute loss, and a relative loss.

Just how important this relative loss for high-achieving students is depends upon where the emphasis for CE resources should be placed. There are about six times as many CE students below the median in achievement as there are above it. If the goal is to help the vast majority of CE students, can one justify allocating exceptional resources to high-achieving CE students on the grounds that they lose more over the summer than their non-CE peers? On the other hand, low-achieving CE students gain over the summer. Perhaps they would gain more if they had special summer services.

Over the Summer, Do High Gainers Lose More than Low Gainers?

The final variation on the summer loss question revolves around the relative loss of high and low gainers. It has been argued that during the regular school year, particularly for CE students, those who gain an exceptional amount lose the gain during the summer. It is thought that these students need the stimulation of intensive instruction to maintain their gains and that lacking such stimulation over the summer they lose more than those achieving smaller gains.

First, we studied the gains and losses of individual Title I students who had experienced the largest and the smallest gains during the regular school year. The students were divided into four equal-sized groups based on the amount of gain experienced from the fall to spring in the regular school year. Then the amount of summer gain or loss associated with each group was determined. Table VIII-7 shows the results.

Those students having the highest measured gains during the school year show quite sizable losses over the summer. On the other hand, those students showing the lowest gains during the school year show equally large gains over the summer. These data are an almost perfect example of the regression-toward-the-mean phenomenon. It is well known that test scores at the extremes of a distribution are less reliable than those near the mean. Gain scores are generally less reliable than individual test scores, and thus even more subject to regression. As would be predicted by regression effects, those students who show very little gain during the school year show a relatively large gain over the summer, while those students showing high gains during the school year show relatively large losses over the summer. These gains and losses are almost certainly artifacts attributable to measurement error and show how difficult it is to generalize about a trend unless both ends of the distribution are considered (or one has extremely reliable measures).

Table VIII-7

Mean Spring 1978 to Fall 1978 Test Score (VSS) Changes for Title I Students by Quarter of Achievement Gain in the 1976-77 School Year

Cohort	Total Number of Students	Quarter of 1976-77 School Year Gain: Lowest	Second	Third	Highest
		Reading			
1-2	1583	22	2	1	-8
2-3	1606	17	7	2	-12
3-4	1646	18	2	-4	-16
4-5	1303	22	6	-5	-19
5-6	1066	23	11	1	-12
		Math			
1-2	854	22	5	-9	-24
2-3	864	30	10	-3	-18
3-4	1023	17	0	-9	-24
4-5	850	22	1	-11	-27
5-6	758	24	8	0	-22

Source: Report 8, Table D-1

There is still the possibility that students associated with the more successful CE projects experience greater losses than those in less successful projects. To investigate this possibility we determined the gains over the school year for each grade in each school that contained Title I students. With the SES data we were not able to associate each student with a particular "project" (which is a very hard to define entity in actual school practice), but since particular grades in a school having Title I students were a well defined unit, where the Title I students were probably receiving quite similar instruction, we used grade in a school in lieu of project. The regular school year gain of each student in a grade was determined and from it the average grade gain was computed. Again, there were four equal groups of grades formed, depending on the average gain of the students in grade. Table VIII-8 shows the gains and losses associated with each group of grades.

Table VIII-8

Mean Spring 1978 to Fall 1978 Test Score (VSS) Changes by Four Levels of 'Project' 1976-77 School Year Gains

Cohort	Average Number of Students at Each Quarter of 'Project' Gain	Quarter of 'Project' School-Year Gains			
		Lowest	Second	Third	Highest
		Reading			
1-2	375	12	6	2	0
2-3	346	8	1	10	-2
3-4	360	9	2	0	-9
4-5	277	4	7	2	-7
5-6	223	8	7	4	2
		Math			
1-2	186	9	0	-2	-9
2-3	190	17	13	-5	-9
3-4	232	-4	-1	1	-11
4-5	181	1	2	-9	-9
5-6	156	13	11	0	-7

Source: Special Tabulation For This Report.

Again we see the same trends that were seen for individual students. Grades are made up of students having a considerable dispersion in their scores and thus, on the average, we would expect less regression towards the mean when grade averages are used for categorization instead of individual scores. Also, group data are more reliable than individual data and thus there is less change. It can be seen that those grades whose students had high gains during the regular school year had losses over the summer, while those grades whose students had low gains over the school year had summer gains that were similar to the losses of the high-gain group. As before, the results are almost certainly artifactual. It is our conclusion from these data that high-gainers do not really experience losses over the summer, nor do low gainers really experience unusual gains over the summer.

From this wealth of data we conclude that there is no absolute summer drop-off, but that there may be a slight, but not particularly significant, relative loss for CE students in comparison to non-CE students. The more detailed analyses of high and low gainers, and of members of high-gain and low-gain projects, lead us to believe that reported relative summer drop-off is more of a measurement artifact than a reality.

SUMMER SCHOOL AND ITS EFFECTIVENESS

Some have suggested that students who have not performed well during the regular school year should go to summer school as an additional learning experience that would help them in the coming school year. It has been thought that this might be particularly important for CE students who are having difficulty in keeping up with their peers. Also, if high-achieving CE students lost a large amount of their school-year gain, it would be particularly important that they attend summer school to help mitigate such losses. Of course, summer school serves functions in addition to instruction in basic subjects. There are recreational and special-interest classes that many students find attractive. Summer school can also serve as a safe haven for children whose mothers are working or need to be away from the home.

What is Summer School and How Available Is It?

In the SES, we surveyed the principals of 52 summer schools in the second-year sample. The average length of the summer sessions was five to six weeks, which means 25 to 30 school days. There were slight tendencies for large districts to offer a few more days of instruction than for small districts, and for medium-poverty districts to offer a few more days of school than high- or low-poverty districts. But these trends were slight and it is appropriate to think of summer school as lasting five or six weeks (see Table 3-12, Report 8). The amount of reading and math instruction is not large. On the average there are about 17 hours of reading instruction and about 14 hours of math instruction. There is no difference in the amount of instruction as grade level increases, nor do Title I students receive more instruction than others (see Table 3-15, Report 8). However, there is a clear tendency for CE students to attend summer school more than non-CE students. By grade cohort, the percentage of CE students who attend ranges from 21 to 32, while the percentage of non-CE students who attend ranges from 7 to 20. In terms of teachers' judgments of need for CE services, twice the percentage of 'needy' students attend summer school than the 'not needy.' In terms of achievement test scores, those attending summer school score considerably lower than those not attending, and this is true both among CE students and non-CE students (see Table 3-7 and D-1 through D-5, Report 8.

About half of all students have summer school available either at their regular-year school or elsewhere in the district, with larger schools more frequently having summer school. Schools having high concentrations of minority students have a slight tendency to have summer school more frequently. About two-thirds of all summer schools are supported by Title I funds, but only a quarter are completely supported by Title I funds.

The previous figures are all derived from the SES study and they are quite consistent with other reports. David (6) intensively studied the Title I summer programs in three states, and she found that "The programs average five or six weeks in length and generally run two to four hours per day." She reports that fewer than 15 percent of all Title I districts have Title I summer programs. At first glance this appears inconsistent with our findings that about half of all students have summer school available. It must be remembered that there are many small and rural districts and that there is a tendency for large schools in large districts to have summer school more frequently. She also reports "...that the summer school program tends to be staffed by non-Title I teachers, often resulting in a staff unfamiliar with participating students." She reports that personnel believe summer school to be academically effective, but also points out that she has no objective data to support such a supposition. We have already cited Austin, Rogers and Walbesser's (1) review of summer studies. They come to the same conclusion.

How Effective Is Summer School?

In judging the effectiveness of summer school it is not sufficient to show that students who attend summer school increase their performances over the summer. To measure the effectiveness of summer school, one must compare students who attended summer school with similar students who did not attend.

Figure VIII-9 shows the reading growth of summer school attendees and non-attendees for the regular school year and for the summer, while Figure VIII-10 shows the same growth for math. These curves show that, for reading, both attendees and non-attendees continue to grow over the summer, and also that the summer growth for the two groups is similar. For math, there is growth over the summer in the lower grades but a leveling off or decline in the higher grades, but again there is no greater achievement for those who attended summer school.

These figures lump CE and non-CE students together. It can be argued that, over the summer, CE students may perform differently. Figures VIII-11 and VIII-12 show a comparison between CE students who did and did not attend summer school. For reading it should be noted that in the first two grades the attendees and non-attendees start the school year quite close together, while in the higher grade cohorts the attendees are the lower achievers. Almost all groups gain over the summer; the attendees do not gain more than the non-attendees. While at first glance one may think there is a trend for attendees to gain more--for example for cohort 1-2--it is contradicted by another cohort--like 2-3. For reading there is no statistically significant advantage as a result of attending summer school. For math there is a suggestion that those who attend summer school gain more than those who do not, but the trend is not statistically significant.

The previous data can be criticized on the grounds that attendance at summer school is voluntary, and that when volunteers are compared with non-volunteers from the same school a biasing element is introduced. It can be seen from Figures VIII-9 and VIII-10 that it is the lower-achieving students who attend summer school and it can be argued from the evidence in Figures VIII-5 and VIII-6 that lower-achieving students will seem to gain more than higher-achieving students

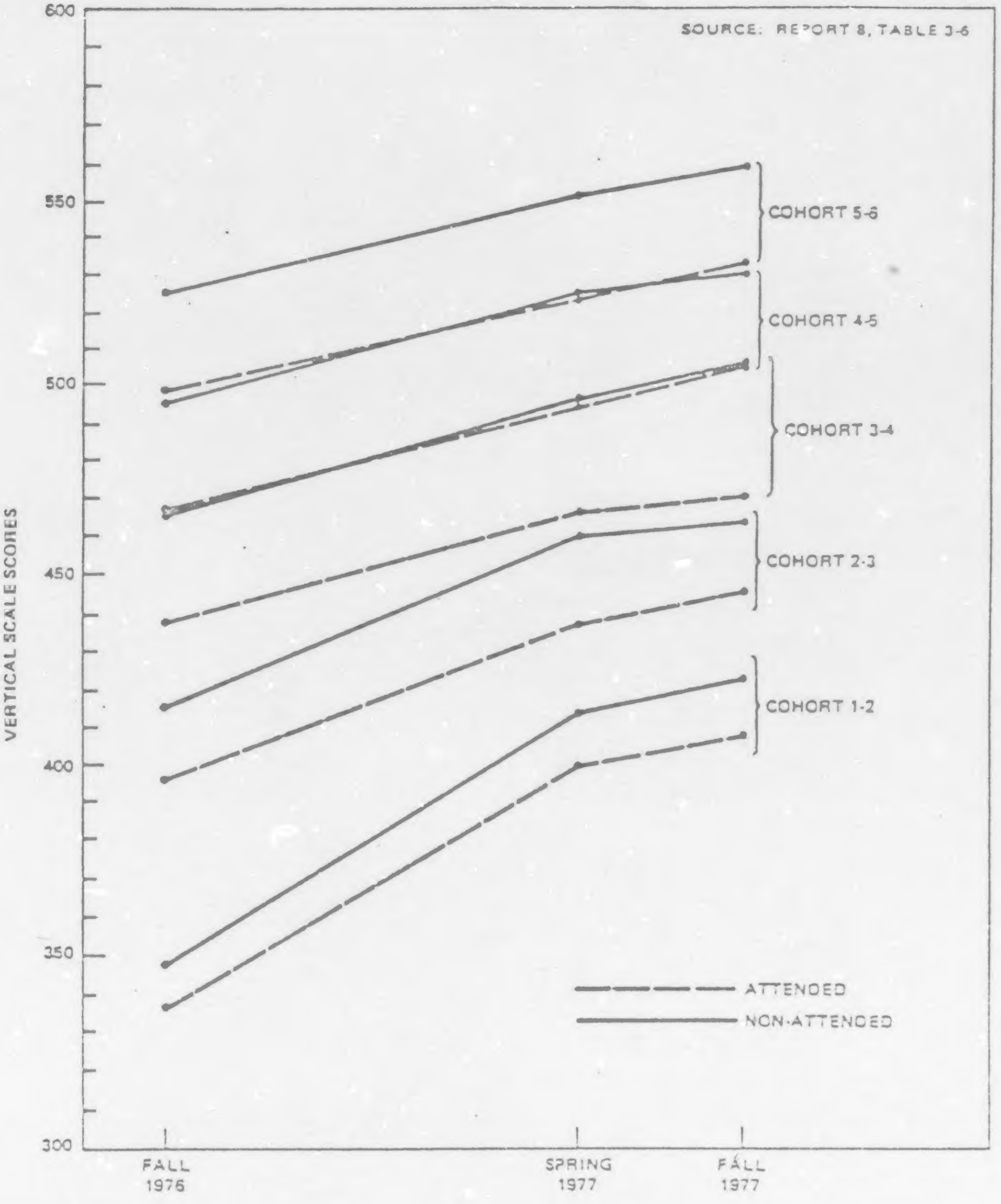

SOURCE: REPORT 8, TABLE 3-6

Figure VIII-9. Reading Achievement by Summer School Attendance

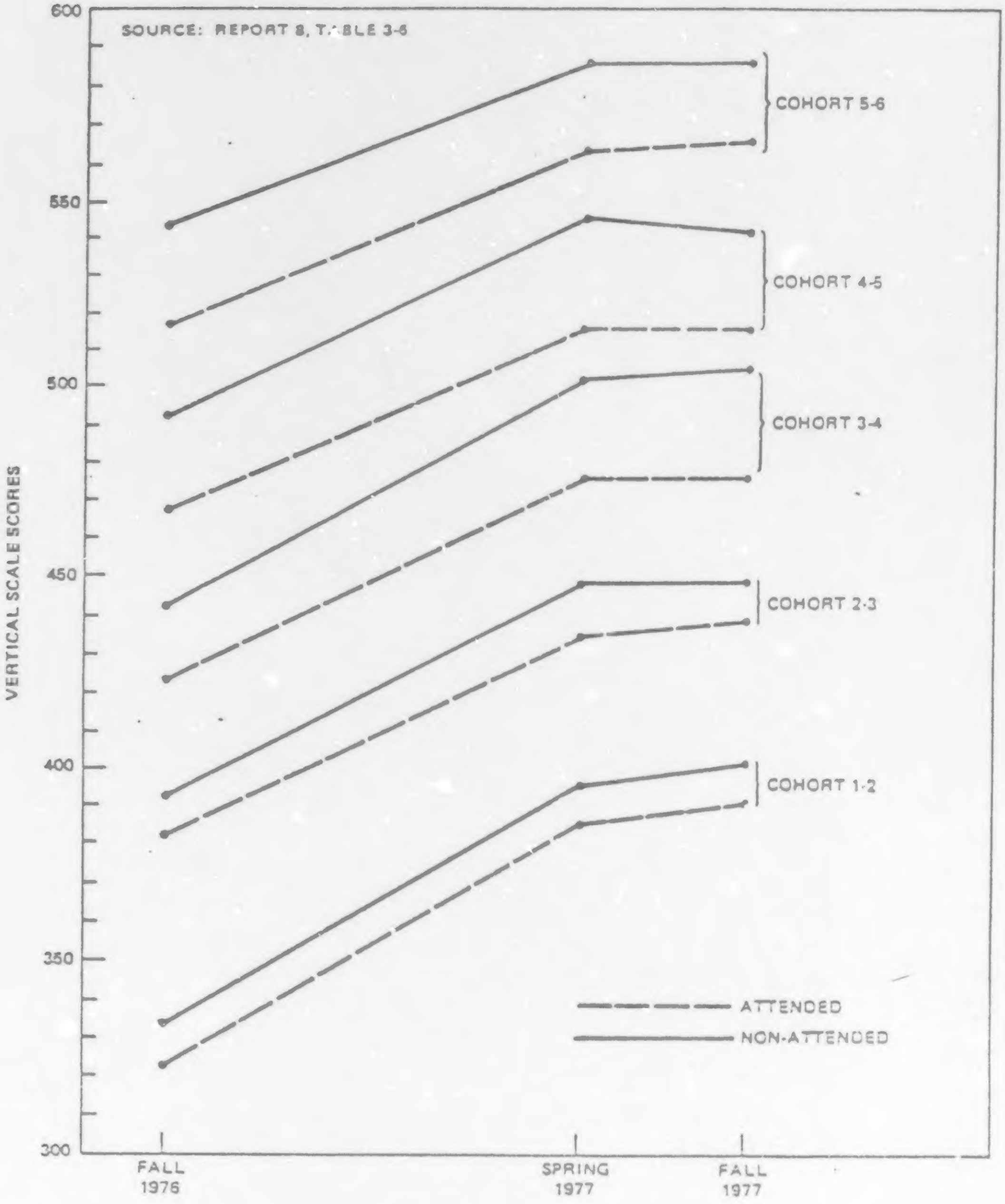


Figure VIII-10. Math Achievement by Summer School Attendance

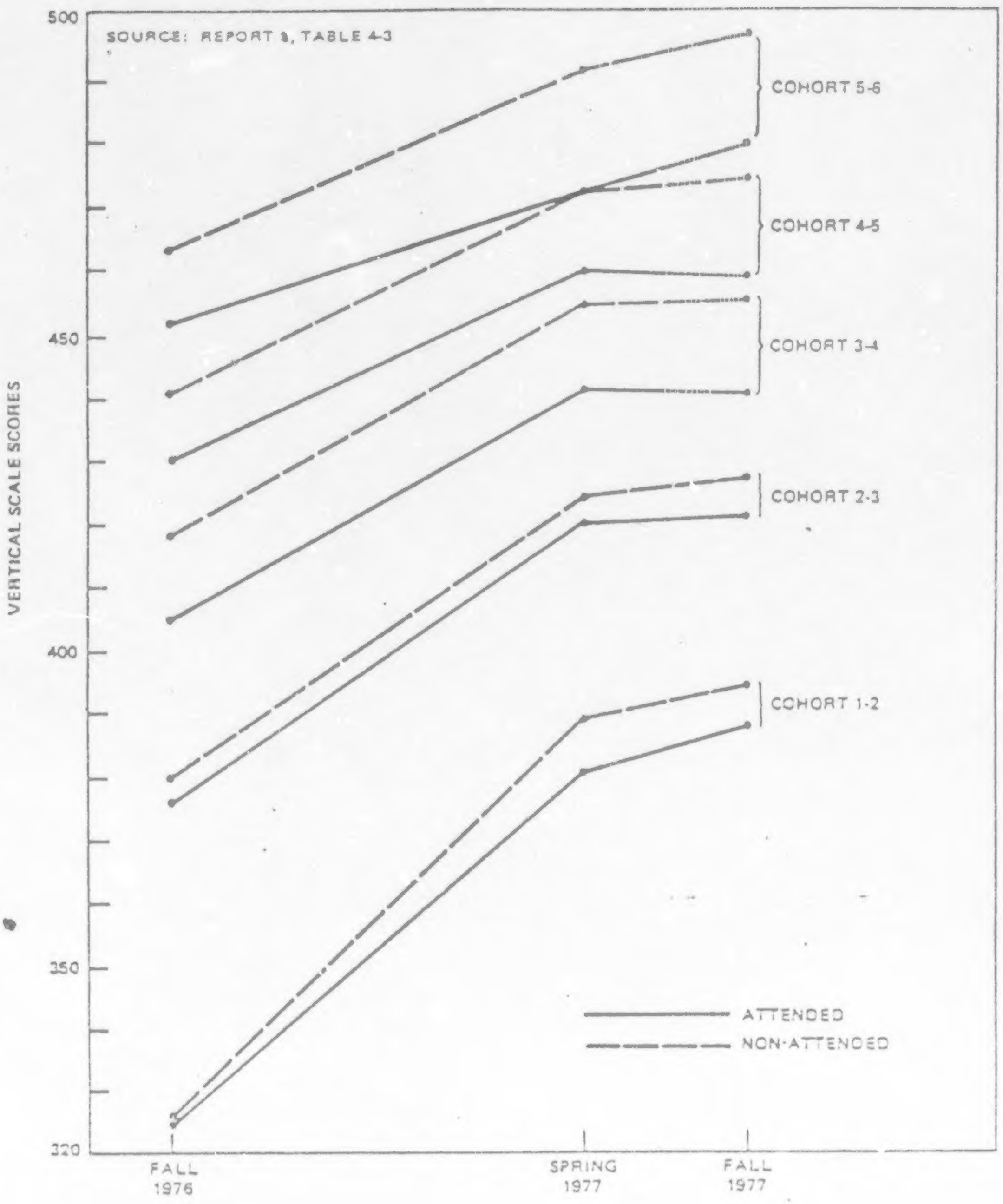


Figure VIII-11. Reading Scores for CE Students Who Attended and Did Not Attend Summer School

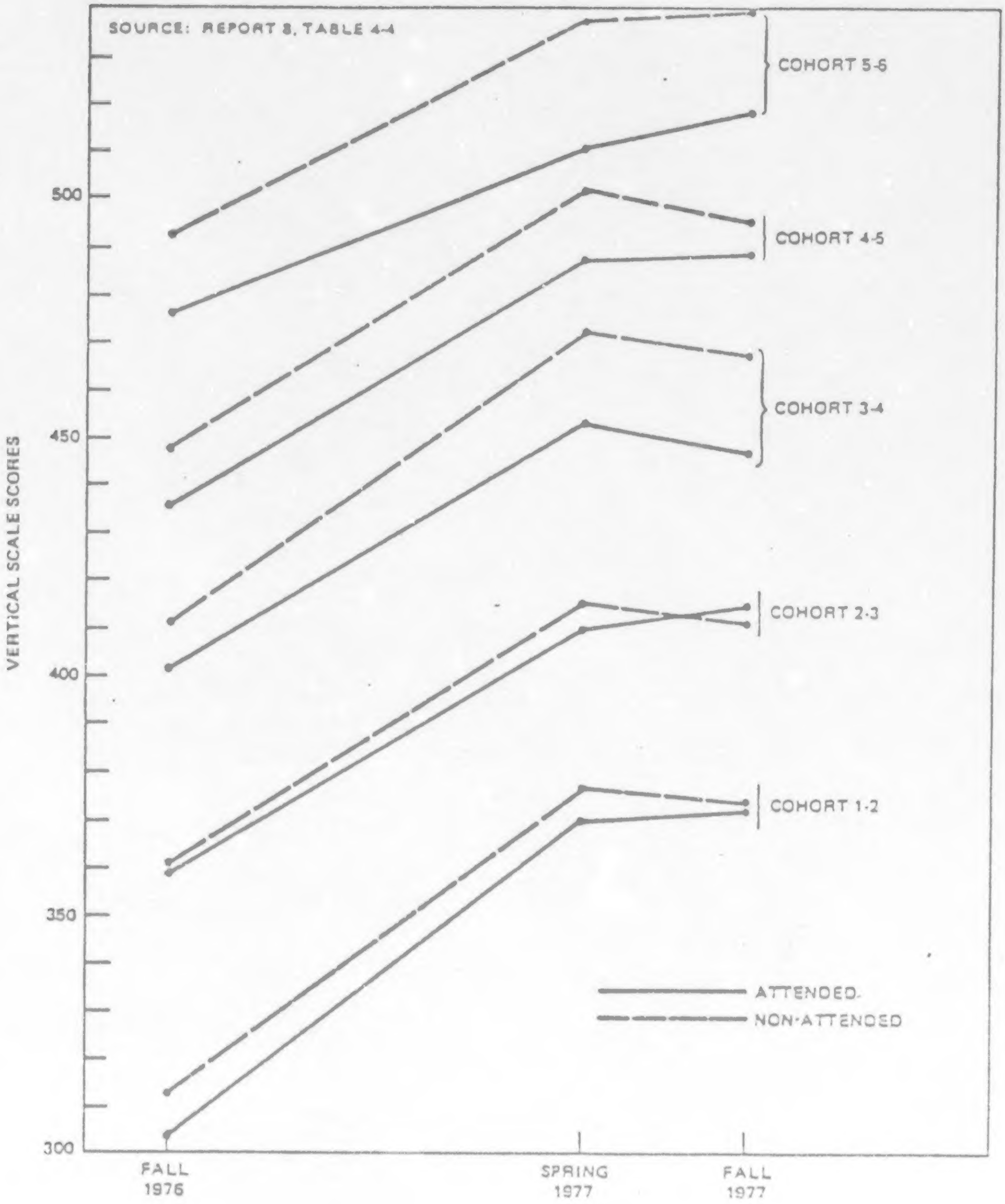


Figure VIII-12. Math Scores for CE Students Who Attended and Did Not Attend Summer School

due to regression effects. In an effort to overcome some of these limitations in the analysis, another comparison group was formed. Title I students from schools that did not have summer school available were compared to students from Title I schools offering summer school. The groups of students were matched on initial levels of achievement. Thus two groups were formed that were matched on achievement and on being Title I students, but one group attended while the other could not attend summer school. Again the statistical tests showed no significant difference in growth between those who attended and those who did not.

In a special report Hoepfner (16) analyzed the influence of attending summer school based on three years of data. In addition to studying the changes from spring to fall testing, he also studied the change throughout the following year for those who did and did not attend summer school. He reports, "for reading, students who did not attend reading summer school generally gain more in the summer than those who attend. The differences are not large, however. In the following school year, the summer-school attendees enjoy an equally slight advantage in achievement gains, but there are no major differences associated with attendance or non-attendance in summer school. In the following school year the summer-school non-attendees show slightly greater growth. The findings do not change when summarized by group based on need for and participation in comp-ed. programs."

All the analyses from the SES data discourage the idea that summer school, as it is now conducted, is an effective mechanism for improving the performance of CE students. As we compare students who attended summer schools with those who did not, we simply find that present summer schools are not effective in raising test scores. But what effect should be reasonably expected from four or five weeks of instruction of less than an hour a day for reading or math? When children are rapidly maturing in their reading skills and can have summer reading experiences without summer school, should we expect summer-school-related reading gains? In the data there is a hint that summer school in the higher grades may be effective in math, and, in comparison to reading, there is less summer growth in math in higher grades. Probably there is less opportunity for math-related experiences during the summer. We should not generalize these results by concluding that summer school cannot be effective. If summer school were longer and had more hours per day devoted to basic subjects, it might result in achievement gains for attendees-but that is still to be demonstrated.

CHAPTER IX. WHAT CLASSROOM PRACTICES INFLUENCE LEARNING?

Summary

The process of elementary education is made up of a number of factors that influence the student's acquisition of knowledge. In this chapter a model of the process of elementary education is developed. The model considers the factors that influence the spring achievement test scores. These factors include: the level of fall achievement, opportunity-to-learn, instructional practices, resources available, staff characteristics, coordination of instruction, instructional leadership, and economic status. The relationship of each of these factors to spring achievement is considered separately and then in combination. It was found that:

- *The best predictor of achievement at the end of the school year is the achievement at the beginning. The gain in spring achievement over all achievement is related in complex ways to the remaining factors.*

- *At the student level the relationship of economic status to achievement scores is only moderate and the relationship to gain scores is small but positive.*

- *Opportunity-to-learn is considered in terms of: amount of time available for learning, the amount of on-task behavior, and the overlap between curriculum content and test content. The relationship between opportunity-to-learn and achievement is quite high for reading and math in the second grade for the poorer schools but not for the higher achieving schools; it is quite high for both reading and math at the fifth grade for all schools. The relationship to achievement gain is more moderate but is quite positive.*

- *Instructional practices operate through opportunity-to-learn to influence achievement. A number of different instructional practices were found to be positively related to opportunity-to-learn.*

- *Resources also operate through opportunity-to-learn in influencing achievement. A lower student/staff ratio was positively related to percent of students on-task, percent of teacher time devoted to instruction, quality of classroom management, and level of direct supervision of students. However, resources were not positively related to achievement except for fifth grade math where the relationship was quite moderate.*

- *Staff characteristics also operate through opportunity-to-learn. Years of teaching experience is somewhat related to achievement gain. Teacher's job satisfaction is fairly strongly related to achievement level and to achievement gain. Years of experience as a principal is positively related to achievement gain.*

- *Coordination of instruction also operates through opportunity-to-learn and is positively related to both achievement level and achievement gain.*

- *Principal's instructional leadership should influence opportunity-to-learn but it was found that there was a negative relationship between principal's instructional leadership and student achievement. It is believed that principals in poorer, lower achieving schools exert stronger instructional leadership and thus the relationship found is explainable in terms of the schools in which the principals work.*

- *Using the techniques of causal analysis a fit was determined between a rational model of the educational process and the data. It was found that while the rational model formed the basis for modeling the educational process, the actual process was considerably more complicated than the rational model had postulated.*

INTRODUCTION

The process of elementary education must be considered in terms of many factors that are intended to influence the student's acquisition of knowledge, both directly and indirectly. A major component of the process is the student whose characteristics are brought to the education process. Among the student's characteristics are native ability, the knowledge acquired in the home, the amount of motivation towards learning, and previous school experiences. A factor in the educational process is the teacher and the characteristics the teacher brings to the classroom. The teacher's knowledge of the subject being taught, ability to organize and communicate that knowledge, ability to maintain a learning atmosphere, motivation, and empathy for the children should all play a role in the education process. Other contributors to the educational process are the learning materials and physical surroundings, including the text books and other learning materials, audiovisual equipment, reading and math laboratories, and the physical nature of the classroom. Another factor is the school leadership and coordination of instruction. All these factors ought to influence the degree to which a student will acquire knowledge during the school year, and each interacts with the others. If we understood the nature of each of these influences and the way they interact, we should be able to modify or influence each factor to maximize the amount of learning of the students.

THE DEVELOPMENT OF A RATIONAL MODEL OF THE EDUCATIONAL PROCESS

In the Sustaining Effects Study we had a unique opportunity to develop an understanding of many of these processes. In the study of high-poverty schools, reported in detail in Report 16, we collected detailed information about many of the factors that make up the process of education. By studying the way each factor influences the acquisition of reading and math skills and how they interact, we can build a model of the education process. Previous studies have attempted this but none have had the rich source of information on as large a number of students and schools as available in the Sustaining Effects Study. Building on previous studies such as those by Cooley and Leinhardt (5) and Fisher, Berliner, Filby, Marliave, Cahen, Dishaw, and Moore (8) and also our own understanding, we developed a rational model of how the factors influence each other and work toward student growth. The model, which determined the data we collected, is shown in Figure IX-1, and consists of the following factors:

Spring Achievement. In the spring of the school year each student took an achievement test in reading and math. This test was the measure of the amount

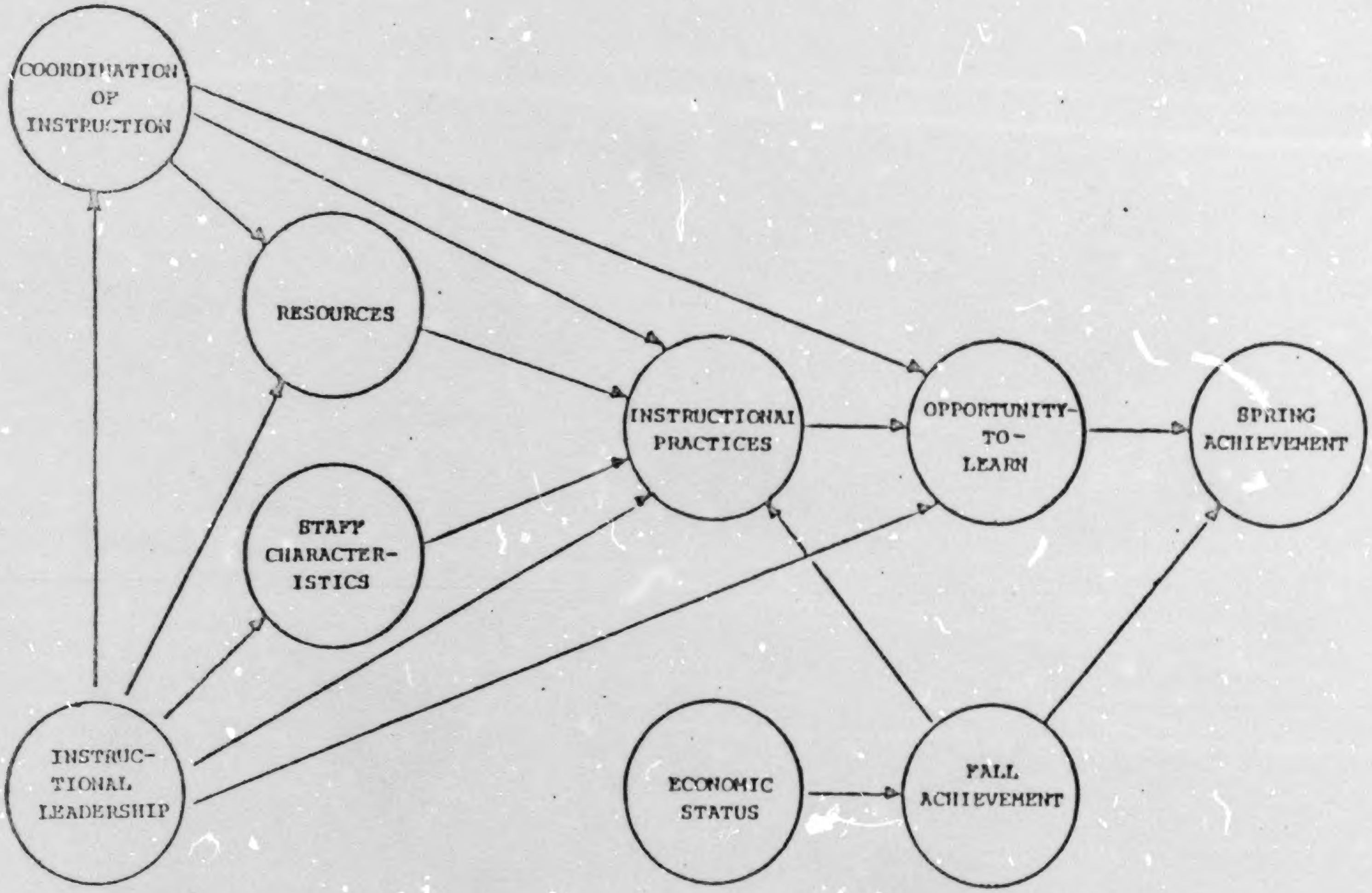

COORDINATION OF INSTRUCTION
RESOURCES
STAFF CHARACTERISTICS
INSTRUCTIONAL PRACTICES
OPPORTUNITY-TO-LEARN
SPRING ACHIEVEMENT
INSTRUCTIONAL LEADERSHIP
ECONOMIC STATUS
FALL ACHIEVEMENT

Figure IX-1

The Rational Model of the Educational Process

Source: Report 16, Figure 1-1.

of knowledge the student had acquired up to that time. The model was designed to account for the acquisition of this knowledge. In other words, if we could specify the amount and nature of all the other factors of the model, we should be able to predict the amount of knowledge gained by the student, as shown by the spring test. If we could do this we would understand the process of education and we could, in actual classrooms, make changes that have high promise of improving learning.

Fall Achievement. In the fall the student comes to school with a certain amount of knowledge that has been acquired from previous schooling, from home and other nonschool experiences, and that is based on the inherent ability of the student to acquire knowledge. This initial status is measured by a reading and math achievement test administered in the fall. The model should allow us to explain the process by which the student's fall-to-spring growth was achieved.

Economic Status. The student's fall achievement level is determined by several factors in addition to previous school experiences. Economic status is a catchall term that includes home environment and parents' encouragement and attitude towards education, but seems to encompass inherent ability too. The model assumes that this factor has already had most of its influence on the child and is reflected in fall achievement scores.

Opportunity-to-Learn. Opportunity-to-learn is defined as the opportunity to learn in school and does not include other learning environments such as in the home. It is composed of three subcomponents. First is Time - the amount of instructional time students are present and potentially able to receive instruction. Second is Overlap - the extent to which the content of the curriculum matches the content of the spring achievement test. And third is On-task Behavior - the extent to which students are attentive during instruction. It is believed that the amount learned is a function of these three factors which make up opportunity-to-learn and that all of the other school factors function through opportunity-to-learn.

Instructional Practices. Specific instructional practices that make up this factor include how teachers allocate their time during lessons and the quality of their classroom management. This variable includes kind of instruction given to students, the amount of time spent in managing instruction, the amount of time spent in managing student behavior, and the amount of time the teacher spends in off-task activities. When teachers spend more time in instruction and manage classrooms more efficiently students will spend more time on-task and study more of the curriculum.

Staff Characteristics. Staff characteristics is made up of those characteristics of the teachers, specialists, principals and other staff members that influence the kinds of instructional practices used. The staff's amount of teaching experience and years at a particular school are included. Also considered is the amount and relevance of recent training for teaching disadvantaged students.

Resources. This factor includes the amount of staff time available for instruction, the number and variety of textbooks and other written material, and the amount and use of audiovisual equipment. Also included are special facilities such as reading or math laboratories, computer-aided instruction and special teaching machines.

Coordination of Instruction. This component includes the degree to which curriculum content is coordinated within the grades and from grade to grade. It also includes the amount of coordination between the regular homeroom teacher and the specialist reading or math teacher. The extent to which instruction is coordinated is thought to influence the way resources are used, the instructional practices used in a particular class, and the opportunity-to-learn (because it influences the extent to which the instruction covers the material contained in the spring test).

Instructional Leadership. It seems reasonable that the principal's interest and emphasis on instruction influences what the students will learn. The principal can exert influence through a number of channels: the kinds of instructional practices used in the classroom can be influenced by selecting staff members who have certain characteristics, and the opportunity-to-learn can be influenced by assuring that a maximum amount of time is devoted to instruction and that the curriculum is taught.

THE RATIONAL MODEL AND HOW THE FACTORS RELATE TO ACHIEVEMENT

The above eight factors are postulated as the determiners of the ninth, Spring Achievement. The analytical method used to determine the relationships among the different factors is known as causal analysis (see Bentler (3) for a review of this method). But before discussing the extent to which the rational model fits the model based on the data we will present material on each of the factors and its relationship to spring achievement. In this way we will gain a better insight into the educational process involved in each factor. The results are based on data collected in the winter and spring of 1978-79 in second and fifth grade classes in 55 high poverty schools. The interested reader should consult Report 16 for the rationale in selecting these schools and grades.

Spring Achievement

About three weeks before the end of the school year each student took a reading and math achievement test. The test used was the Comprehensive Tests of Basic Skills (CTBS) and the level of the test used was the one that was judged to be at the appropriate difficulty level for the particular second and fifth grade classes at each school. The details of test administration, the method of scaling the scores, and the technical details regarding reliability and the interrelations among the different subtests are given in Report 9.

Fall Achievement

About three weeks after the beginning of the school year each student took the appropriate math and reading achievement test. This fall test was used to measure the level of achievement possessed by the students on entering the school year. By comparing the achievement level in the spring with that in the fall, a gain score could be determined. If our model is correctly conceived, then those students who gained the most would have received the most propitious mix of the other seven components of the model and we could determine the best combination of factors to enhance the educational process.

Economic Status

The major criterion for selecting schools for the in-depth study was the average poverty of the students in each of the schools. Although some degree of economic homogeneity resulted, sufficient variability remained to warrant including economic status in the analyses, primarily in order to distinguish school from non-school effects. The data on students' economic background were obtained from a questionnaire completed by each teacher. This questionnaire included items about parents' education and about participation in free or reduced-price meals programs. These data were combined to form a student-level index of economic status. A score of 100 or less indicates income below the Orshansky poverty level. The aggregates used to select the schools were based on all students in the schools during the year preceding data collection. The aggregates used in the analyses were based on the second and fifth grade students enrolled during the study year. The school aggregates used in the analysis ranged from a low of 105 to a high of 231. The overall mean was 160.

Table IX-1 shows the relationship between economic status and achievement.

Table IX-1

Correlation of Economic Status with Achievement*

	Fall Achievement	Spring Achievement	Gain
Student Level			
Grade 2			
Reading	.31	.38	.17
Math	.29	.32	.10
Grade 5			
Reading	.35	.37	.07
Math	.27	.31	.09
School Level			
Grade 2			
Reading	.54	.67	.40
Math	.40	.61	.27
Grade 5			
Reading	.65	.62	.14
Math	.51	.53	.19

*The number of students for the student level correlations ranges from 2,753 to 3,282, the number of schools is 55 in all cases.

Source: Report 16, Table 8-1

First it should be noted that the relationship between achievement and economic status is lower at the student level than at the school level. At the student level the correlation is about .32, while at the school level it is about .57. The sizes of these correlations emphasizes the fact that economic status is only a moderate predictor of academic achievement for individual students. Also, it should be noted that the correlations for the gain scores are much smaller, on the average about .18. It will be seen that the relationships for math are lower than they are for reading, probably reflecting the fact that reading is more readily learned in the home than is math. Also the gain scores in the fifth grade are somewhat smaller than they are in the second grade. This implies that social and economic factors may be having a smaller influence on achievement at the higher grades than at the lower ones.

It was thought that economic status might be related to opportunity-to-learn based on the idea that schools having higher economic status students might offer better educational opportunities. Thus economic status was correlated with instructional time, on-task behavior, and test-curriculum overlap, but the resulting correlations were so mixed and of such small magnitude that no pattern could be seen.

Opportunity-to-Learn

In continuing our exploration of each of the factors shown in Figure IX-1, we see that opportunity-to-learn is the factor that leads directly to spring achievement and that coordination of instruction, instructional leadership and instructional practices all influence achievement through opportunity-to-learn. We defined opportunity-to-learn as the amount of time that students are present and attentive to lessons that are relevant to the test. There are three parts of this definition that we were able to measure:

Time - the amount of instructional time students are present

On-task Behavior - the extent to which students are attentive during lessons

Overlap - the extent to which the content of the spring achievement test matches the content of the curriculum.

The concept of opportunity-to-learn refers to the opportunity at school. Of course there are also learning opportunities outside of school. These are thought to be represented by student's Economic Status, where it is assumed that more advantaged children spend more time at home engaged in educationally relevant activities.

Time

It seems obvious that as students spend more time at learning activities they should learn more. Starting with Wiley's (38) studies and including many others, it has been shown that there is a relationship between amount of time spent learning and achievement, but the relationship does not seem to be as straightforward as might be supposed. There are several ways of measuring learning time. The simplest is to determine the number of days school is in session, or this can be corrected for time missed due to absences and special activities. Another way is to ask teachers how much time they spend in a typical week giving instruction in reading or math. Still another way is to observe classes and record how much time is actually devoted to instruction. We tried all of these methods and did not find them to be as strongly related to one another as expected. In Report 16 (p. 2-13) it is reported that the correlation between the teacher's reports of the amount of time spent teaching reading and math and the amount observed in the classroom was only about .25. While the relationship between observed time in instruction and spring achievement was generally positive, the correlations were generally small. Similar results were obtained when the measure of time was based on the number of days the school was in session between the fall and the spring tests. Table IX-2 shows the correlations with achievement for both measures of time.

Table IX-2

Relationship Between Two Measures of Instructional Time and Achievement*

	Fall Vertical Scale Scores	Spring Vertical Scale Scores	Gain
	Time Based on Observed Classroom Instruction		
Grade 2			
Reading	-.04	.04	.22
Math	.18	.27	.12
Grade 5			
Reading	.12	.26	.28
Math	.05	.16	.17
	Time Based on Number of School Days between Fall and Spring Test		
Grade 2			
Reading	.18	.27	.21
Math	.01	.30	.24
Grade 5			
Reading	.26	.26	.08
Math	.25	.21	-.02

*Based on 55 schools.

Source: Report 16, Tables 2-4 and 2-5.

On-Task Behavior

The second part of opportunity-to-learn is on-task behavior, that is the average proportion of students actually attending to the instruction being given. Assessments of the on-task behavior of all students in each instructional group were made at five-minute intervals throughout each lesson observed. With each assessment, observers recorded the total number of students in the instructional group who were present, as well as the number of students on-task. In general, on-task behavior referred to activity directly related to the acquisition of subject-matter information. Students were judged to be off-task when engaged in non-cognitive activities, even when the teacher assigned these activities. Based on these observations it was determined that students were on-task about 79 percent of the lesson time. This figure was about the same in the second and fifth grades and in reading and math. Table IX-3 shows the relationship between observed on-task behavior and achievement. It will be seen that while the correlations are rather small they are all positive. (These correlations are for the total instructional unit rather than for each classroom; that is they are for the unit of instruction which had a common set of students, teachers, and subject matter.)

Table IX-3

Correlation of Amount of On-Task Behavior and Achievement*

	Fall Achievement	Spring Achievement	Gain
Grade 2			
Reading	.07	.11	.11
Math	.08	.12	.12
Grade 3			
Reading	.05	.06	.05
Math	.07	.10	.02

*Number of Total Instructional Units varies from 322 to 642.
Source: Report 16, Table 2-8.

Overlap of Test Content and Curriculum

In Chapter V we presented a discussion of the way we measured the extent to which teachers reported they had acutally taught the material that was contained in the tests. A high degree of correspondence was noted between the knowledge the tests measured and the material the teachers said they taught. This measure of overlap is the third element making up opportunity-to-learn. We determined the relationship between overlap and achievement for two different sets of schools. It will be remembered that each grade was administered the form of the achievement test estimated to be the most suited to level of attainment. In 20 of the high-poverty schools the easier level 1 form of the test was given in the fifth grade and in the remaining 35 schools the more appropriate, harder, level 2 form was administered. Thus in a number of analyses in Report 16 the analysis is done separately for these two sets of schools. Table IX-4 shows the relationship between the percent of curriculum overlap with achievement for these two groups of schools. Again the correlations are based on total instructional units in each school.

Table IX-4

Correlation of Curriculum-Test Overlap with Achievement*

	Test Level 1 Schools			Test Level 2 Schools		
	Fall Achievement	Spring Achievement	Gain	Fall Achievement	Spring Achievement	Ga
Grade 2						
Reading	.10	.10	-.01	.33	.35	.
Math	.26	.25	.04	.18	.25	.
Grade 5						
Reading	.29	.33	.12	.19	.27	.
Math	.29	.36	.14	.21	.16	-.

*Total Instructional Units vary in number from 139 to 374.
Source: Report 16, Table 2-12.

It will be seen that almost all of the correlations between achievement and the degree of overlap between curriculum content and test content are positive and vary from quite small to modest. One might think that these correlations should be larger but their size tends to emphasize the fact that there are many processes determining achievement and that while teaching test content is important, there are many ways students learn the material on which they are tested.

At the beginning of this discussion of opportunity-to-learn we mentioned that the concept was defined in terms of time spent learning, amount of on-task behavior, and the amount of test-curriculum overlap. The final, summary measure of opportunity-to-learn was made up of the product of the percent of overlap, the percent of students on-task, and the time in instruction. Table IX-5 shows the correlations between the achievement test scores and the summary measure of opportunity to learn.

Table IX-5

Correlations Between Opportunity-to-Learn and Achievement

	Test Level 1 Schools*			Test Level 2 Schools*		
	Fall Achievement	Spring Achievement	Gain	Fall Achievement	Spring Achievement	Gain
Grade 2						
Reading	.76	.69	.25	.02	.05	.09
Math	.75	.66	.28	-.02	.14	.22
Grade 5						
Reading	.31	.62	.27	.51	.62	.50
Math	.36	.41	-.09	.21	.27	.10

*There were 20 Test Level 1 Schools and 35 Test Level 2 Schools.
Source: Report 16, Table 2-13.

Inspecting Table IX-5 it will be seen that the correlations vary from slightly negative to quite high positive. First it should be remembered that these correlations are fairly unstable because they are based on a small number of cases. Similar correlations were computed where opportunity-to-learn was based on the measure of time using the instructional group as the unit of observation and also on this measure aggregated to the school level. The relationship of these measures with achievement also varied considerably, with the school-level correlations being of the same order of magnitude as those in Table IV-5, while those for the toal instructional group were considerably smaller. As will be seen later, the validation of our educational process model was difficult because of the type of variability we see in this table. Nevertheless, it seems that the vast majority of the evidence points to a fairly positive relationship between the composite opportunity-to-learn and achievement.

Instructional Practices: Allocation of Teacher's Time to Instructional and Non-Instructional Activities

Instructional practices are activities that teachers engage in with their students in the classroom. Our measures of these practices come from observations of the instructional groups, from interviews and from questionnaires completed by the teachers.

In the classroom, teachers must spend their time on a number of different activities, including instruction, making and collecting assignments, handling disruptions, and attending to housekeeping activities. Through the observation of teachers in their classrooms and instructional units, we classified their use of time as:

Instruction - conveying information to be learned through explanations, questions, or the monitoring of student understanding.

Instructional Management - activities that manage the flow of instruction, such as giving assignments, handling material and equipment, and checking and recording completed work.

Behavioral Management - activities related to controlling behavior, such as administering discipline, setting classroom standards, and monitoring directed at maintaining order.

Off-Task - activities with no apparent connection to instructional objectives, such as absence from the classroom, lunch-money collection, and personal conversations.

Observers recorded the time teachers spent in the last three activities, and time in instruction was taken as the remainder of the total lesson period. The estimate for each type of activity was converted to a percentage of the total lesson period. Over all grades and subjects it was found that 70% of the time was spent in instruction, 19% in instructional management, 2% in behavioral management and 4% in off-task activities. Generally there is not much variability in time allocations between reading and math, different grades, or level 1 and level 2 schools. Of course there is considerable variability from classroom to classroom. The way in which teachers allocate their time should be related to the activities engaged in by their students. Since the goal of instruction is reached through student on-task behavior, we investigated the relation between the way teachers allocated their time and student on-task behavior. We found that over all grades and subjects the correlation between teachers' time spent in instruction and student on-task behavior was .30, that between time in instructional management and student on-task behavior was -.21, between time spent in behavioral management and student on-task behavior was -.48, and between teacher off-task activities and student on-task activities was -.09. It will be recalled that, in an absolute sense, teachers spent relatively little time in behavioral management but it has the highest correlation with student on-task behavior. Behavioral management problems seem to spread; when the teacher disciplines one student, this often distracts other students from their assigned tasks. Also time spent in instructional management takes time away from instruction and tends to give students an opportunity to go off task. Due to the interaction of these items it is clear that the teacher who organizes instruction efficiently can maximize the time spent on ~~interaction~~ instruction and thereby increase student on-task activities.

The way teachers spend their time is related to classroom management practices. The observers rated the teachers on cognitive monitoring, that is how well the teacher assessed student understanding. They also rated them on on-task monitoring, that is the efficiency with which the teacher handled student off-task behavior; and they rated them on organization of activities, which refers to the degree to which there were routine ways of dealing with recurring situations. While conceptually these are separate activities, the intercorrelations among them were so high that we formed one scale called classroom management. The correlation between this measure and student on-task behavior was .65. The correlations of classroom management with teacher time in instruction was .29, in instructional management -.14, in behavioral management -.49, and in off-task activities -.18. Thus we see that teachers who have good classroom management allocate their time well, which results in students on-task. It is apparent that teachers can substantially affect the amount of time that students attend to learning activities. In further analyses it was shown that the quality of classroom management is more influential than teacher time allocation in predicting student on-task behavior.

In trying to understand how student on-task behavior could be increased, the sources of off-task behavior were examined. As previously noted, students were off-task about 21% of the time. If this figure could be reduced significantly there should be an important increase in amount learned. Leinhardt, Zigmond, and Cooley (21) have argued that an increase of as little as 10 or 15 minutes a day in silent reading would significantly increase performance for disadvantaged students. We examined the sources of off-task behavior and they are presented in Table IX-6.

It can be seen that about one half of all the off-task behavior is under the teachers' control and even the largest category, Solitary Student Activities, would be under teacher control if the student were highly motivated. The point is that teachers have an opportunity to increase the amount of on-task behavior by organizing their activities and using good motivating techniques. The methods teachers use to motivate students were classified into four categories:

Motivating students with appropriate materials
Motivating students with rewards based on accomplishments
Establishing a warm, positive relationship with students
Threatening or punishing students.

In the teacher interview we asked teachers to tell us the kind of techniques they used to motivate their students. About 45% of the teachers mentioned the use of interesting and appropriate materials; about 20% mentioned using

Table IX-6.

Sources of Student Off-Task Behavior

	Type of Group[1]		
	Few Students Off-Task	Some Students Off-Task	Many Students Off-Task
	%	%	%
Largely Under Teacher Control:			
Teacher Initiated Distractions	4	6	9
Lack of Assignment	5	9	13
Distraction by other Students	23	27	32
Somewhat under Teacher Control:			
Handling Materials & Equipment	6	8	7
Changing Activities	1	1	1
Not under Teacher Control:			
Outside Interruptions	8	5	4
Solitary Student Activities	51	45	35
TOTAL	100%	101%	101%

[1] Few students off-task = 7% or fewer off-task.
Some students off-task - More than 7% and less than 35% off-task.
Many students off-task - 35% or more students off-task.

Source: Report 16, Table 3-7

rewards based on accomplishments; about 20% mentioned establishing a warm, positive relationship; and about 30% mentioned the use of threat and punishment. (The percentages add to more than 100% because more than one answer was allowed.) We observed the kinds of methods being used in the classroom and found that these often differed from the methods teachers reported they used. There were only very modest correlations between the kind of motivations teachers reported they used and the frequency of on-task behavior in the classroom. Thus we were unable to suggest any one motivating technique as being particularly appropriate. We also explored a number of other teacher practices to see if they were related to on-task behavior. We examined the use of lesson plans, the frequency of feedback of information about student strengths and information about student strengths and weaknesses, the individualization of instruction, the use of subgroups, and the use of a diagnostic-prescriptive approach to instruction. Among the approaches, the use of lesson plans was the most related to on-task behavior, but that correlation was only .09.

The final classroom practice to be examined is the amount of direct supervision or the amount of teacher-student interaction. Some teachers divide their classes into subgroups and instruct each one in turn. Some teachers also have an assistant who works with individuals or certain groups while the teacher works with others. Depending on both these factors--how the class is subgrouped and how many staff give instruction--none, few, or many of the students may work independently during little or much of the lesson; the others are being supervised. We refer to the measure based on these two factors, subgrouping practices and level of staffing, as level of direct supervision. However, it may also be useful to think of it as amount of teacher-student interaction, especially since other researchers have obtained promising results by analyzing differences among classrooms in terms of differences in amount of interactive learning activity (Stallings, Needels, and Staybrook (28)). Either conceptualization fits the measure that we will now describe. Data for assessing direct supervision derive from observers' estimates of the percent of each staff member's time spent with different-sized subgroups. Observers reported the total minutes each staff person was present, along with the percent of that time each staff member spent off-task or working with individuals, and working with subgroups of different sizes. From these estimates, we constructed an index of the average percent of students in the instructional group who were directly supervised during the lesson.

Table IX-7 summarizes the relations of direct supervision to student on-task behavior, and to two teacher-behavior variables--time in instruction and quality of classroom managment. These relations indicate that, in general, the more teachers directly supervise their students:

- the more those students are attentive to learning activities;
- the higher the quality of their classroom management;
- the more lesson time teachers spend giving instruction.

Table IX-7

Correlation of Percent of Students' Direct Supervision and On-Task Behavior, Quality of Classroom Management, and Teacher Time in Instruction

Correlation of Direct Supervision and:	All Schools
Percent of Students On-Task	.30
Quality of Classroom Management	.19
Percent of Teacher Time in Instruction	.29

For all schools there were 1,219 students observed.

Source: Report 16, Table 3-14.

Before we comment on the implications of these findings, we note that they accord well with impressions we formed from reading observers' narrative reports. Also, during their scans of student behavior, observers recorded the assigned activities of students who were off-task. Though this information was not tallied, our impression is that assignments to be completed independently were much more likely to be associated with off-task behavior than assignments that involved working in groups with the teacher.

The following narrative gives a flavor of how students behave in these non-supervised situations. The instructional group described is a fifth-grade math class. The 24 students are working independently on assignments from a computer-managed, commercially available system. An aide divides her time between two small groups of three students each. The teacher never monitors the class as a whole, but assists individual students whom she calls to her desk. As the observer described it:

> Through the rest of the classroom, general chaos ensued. There were children fighting in the corner, talking to each other. One child was up on top of the desk, another child tipped over a whole stack of papers on the floor and spent a great deal of time on the floor playing with them, and children came and went at will around the room even though it appeared that the majority of the time it had nothing to do with the directions in their lesson. For example, they were walking over and talking to other students and then returning to their desks. Or, walking out of the whole classroom area but yet not having any papers whatsoever in their hands.

The observer comments:

> When the aide was at the first table, all of the students were on-task, but as she moved over to the next table, the students that she had formerly been working with went off-task for about 75 percent of the time when she was gone.

and, further:

> If it hadn't been for the presence of the aide who worked with six students during the lesson, the only students who would have had seemingly any instruction at all . . . were the sixteen students that the teacher worked with individually at different points during the lesson . . . (but) they only seemed to remain on-task while she was actually working with them.

Although this example may seem extreme, we have others like it, and the situation--off-task behavior associated with lack of direct supervision--seems to be quite common. A more detailed breakdown shows that lack of supervision is more strongly connected to lack of attentiveness to learning activities in second grade, especially in reading. The direction of these differences is in accord with the notion that younger students are less able to work on their own.

Turning now to the implications of these findings, it seems relevant to say that though weaker than the relations of quality of management to students' on-task behavior (Table IX-7), they are in a sense more impressive. For being more explicit, they are more directly interpretable. These data show that teachers who arrange their instruction so as to directly supervise greater proportions of their students are more successful in keeping students on-task. In practice, this means that teachers who teach to the whole class or to larger subgroups will have students who spend greater amounts of their time in learning activities. Subgrouping that results in more students working independently is likely to lead to students not engaged in learning activity.

One cannot, of course, conclude that whole-class instruction is better than small-group or individualized instruction in every situation and for outcomes other than on-task behavior. However, the above analyses, as well as studies by others, do suggest that a very important ingredient in successful small-group or individualized instruction is the number of staff. In the next section we will take up questions of staff resources in more detail.

Resources

The next component in our model of education is resources. By resources we mean the number of teachers, aides, clerical assistants, texts and other material, and audiovisual equipment available for use in instruction. We believe that resources act through instructional practices to increase opportunity-to-learn.

Staff-Student Ratio

During their observations, data collectors noted all persons who were present and had instructional responsibilities with the group being observed. Each staff member was classified as regular, specialist or aide, and the total number of minutes each one was present was recorded. These data were the basis for the construction of the paid staff-student ratio. The staff-student ratio was the amount of staff time spent in instruction divided by the number of students present during the instruction. The ratio corresponds to the number of staff minutes available per student, per hour of instruction. Typically, there were about seven and one half minutes of staff time available for each student in an hour of instruction. There was slightly more time available in reading instruction than in math instruction. It also was found that there were generally more instructional resources being devoted to low achievers than to high achievers. It is usually assumed that a staff-student ratio that allows more time with each student is associated with favorable classroom characteristics. Table IX-8 shows the relationship between staff-student ratio and a number of these characteristics.

Table IX-8

Correlations of Staff-Student Ratio with Classroom Characteristics

		Classroom Characteristics			
		Percent of Students On-Task	Percent of Teacher Time in Instruction	Quality of Classroom Management	Level of Direct Supervision of Students
All Grades and Subjects	(1,119)	.25	.11	.27	.30

Source: Report 16, Table 4-4.

It will be seen that as the staff-student ratio increases, the percent of students' on-task increases, and also the percent of teacher time spent on instructional activities increases, as does the quality of classroom management and the level of direct supervision of students. All of these characteristics are generally considered good classroom practices and presumably result in greater opportunity-to-learn.

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Use of Equipment and Materials

Another resource that influences instruction is the amount of equipment and materials used during instruction. There is a surprising variety of such materials used, as illustrated by the following table.

Table IX-9

Equipment and Materials Teachers Report Using

Reading		Math	
Equipment	Materials	Equipment	Materials
• tape recorder	• textbooks, readers	• tape recorder	• textbooks
• record player, radio	• supplementary readers	• record player, radio	• reference books
• slide projector	• reference books	• slide projector	• workbooks
• movie projector	• free reading books, magazines, newspapers, comics	• film projector	• dittos
• film strip projector	• workbooks	• opaque projector	• games, puzzles, flash-cards, manipulables, counting and measuring devices
• opaque projector	• dittos	• overhead projector	• programmed texts and publishers' kits
• overhead projector	• games, puzzles, flashcards	• television	• visual aids, charts, teacher-made materials
• television	• individual reading kits or sets, including programmed texts and publishers' kits	• listening center	
• listening center	• visual aids, charts, pictures, teacher-made materials	• electronic calculator	
• feedback teaching machine		• computer terminal	
• controlled readers, speed reader		• feedback teaching machine	
• typewriter			
• computer terminal			

Source: Report 16, Table 4-8.

Perhaps the most striking aspect of equipment use is that the most intensive use occurred in the context of compensatory and remedial education. This is supported by the generally negative correlations between amount of equipment use and fall achievement scores, which are about -.10. When the relationship between equipment use and achievement gain for the year was examined, it was found that the relationship was negligible for all grades and subjects, except for 5th grade math where there were positive correlations of .21 for low achieving students and .24 for regular students. Why this unusual result for fifth grade math was found is hard to explain, but it should be noted that frequently throughout the results of this study, fifth grade math seems to give stronger relations than any other subject or grade. It is possible that fifth grade math starts involving more abstract concepts than other grades and that different practices and materials have more effect on abstract material.

The correlations between the use of equipment and materials and student on-task behavior were insignificant. Similarly, the relationships between equipment and materials use and the opportunity-to-learn components--on-task behavior, test curriculum overlap, and instruction time--were all slightly negative to insignificant, as were the percent of teacher time in instruction and quality of classroom management. Generally we found that there was substantial use of a wide variety of equipment and materials but we failed to find this use significantly related to classroom practices or to achievement gains.

Staff Characteristics

Another of the factors making up the model of the education process is staff characteristics, thought to affect various instructional practices that influence opportunity-to-learn. The main staff characteristics measured were teacher's amount of experience, training, and job satisfaction. Similar measures were obtained for principals.

Teacher Experience

The regular teachers at the 55 high-poverty schools had an average of just over 11 years of teaching experience, of which a little over seven years was at the school in which we observed them. CE specialists had slightly more teaching experience than regular teachers, averaging a little over twelve years but about the same amount of time at their present school. There were small but positive correlations between the amount of teaching experience and students' achievement. These relationships are confounded by the fact that in these schools the more experienced teachers tend to be assigned the lowest achieving students who tend to show the least improvement. Our results show that relationships between years of experience and student gains are stronger for regular teachers than for specialists. But in interpreting this, we need to keep in mind that the specialists usually teach the lower achieving students. In considering the relationships for second and fifth grade and for reading and math (for all teachers combined) the correlation between years of teaching experience and achievement gains ranges from 0.7 to .25, while for the regular teachers the correlations are from .10 to .32.

We also investigated the relationship between years of experience and the factors making up opportunity-to-learn. Generally there were very small negative relationships between years of experience and student on-task behavior, there was essentially no relationship between amount of time in instruction and experience, and there were small to moderate positive correlations between experience and test-curriculum overlap. These latter correlations suggest that as teachers become more experienced they tend to cover curriculum that is included in the test of achievement. We also investigated the amount of recent training in relation to student achievement. Generally teachers who had the most recent training were assigned to the lower achieving students. Nevertheless, in the fifth grade, there were positive relationships between the amount of recent teacher training and student gain, about .12 for reading and .22 for math.

Job Satisfaction

Teacher satisfaction was assessed from both interviews and questionnaires. In the interview, teachers were asked to rate their work relationships with other teachers who taught the same students, with other teachers in the same grade, with the remaining teachers, and with the principal. In the questionnaire they were asked to evaluate the school as a good place to work, the extent to which teachers at the school worked well together, and the effectiveness of the way conflicts were handled. Based on both sources of information a teacher satisfaction scale was produced. Table IX-10 shows the relationship between teacher satisfaction and student achievement.

Table IX-10

Correlation of Teacher Satisfaction and Student Achievement

School Level (N=55)	Fall Achievement	Spring Achievement	Gain
Grade 2			
Reading	.26	.33	.30
Math	.12	.21	.16
Grade 5			
Reading	.33	.43	.32
Math	.41	.41	.[illegible]7

Source: Report 16, Table 5-8

These correlations between teacher satisfaction and student achievement are impressive and are consistent with a number of other studies which have obtained similar results (see Report 16 for references). It is possible that these relationships are circular; that is, teachers are satisfied when their students do well, while at the same time satisfied teachers do well and so do their students. It has also been argued that satisfied teachers have students of higher social status, who do well because of their better preparation, and thus the teachers are more satisfied. In an attempt to understand these relationships, some analysis was done using partial correlations among teacher satisfaction, economic status of the students, and student achievement. The results showed some interesting grade differences. At the 5th grade, the relationship of student socioeconomic status to teacher satisfaction disappears when fall achievement is controlled for. In other words, student background exerts no effect on teacher satisfaction independent of student fall achievement. At the 2nd grade, however, both factors appear to have some effect.

Teacher satisfaction has a small positive relationship with percent of students on-task; satisfied teachers spend less of their time on behavioral management, and have a higher quality of classroom management. Also the more satisfied teachers have a considerably higher test-curriculum overlap.

Principal Characteristics

Principals' experience varied considerably, ranging from completely new principals to those who had served many years. Both the amount of experience as a principal and the number of years at the particular school under study were associated with student achievement as shown in Table IX-11.

First, it should be noted that the more experience the principal has, the higher the student achievement gain. But it should also be noted that there is a positive correlation between years of principal experience and the fall achievement scores. This argues that the more experienced principals are assigned (or choose) the schools with higher achieving students and correspondingly, schools located in more affluent sections of the community. Since greater principals' experience is associated with larger student achievement gains, we would expect principals' experience to be related to a number of classroom practices, but generally this is not the case. We explored the relationship between principals' experience and the opportunity-to-learn components and they were generally very low and mixed in direction.

Table IX-11

Correlation of Principal's Experience with Student Achievement

	Fall Achievement	Spring Achievement	Gain
Years as Principal			
Grade 2			
Reading	.10	.32	.29
Math	.14	.25	.14
Grade 5			
Reading	.09	.16	.18
Math	.15	.30	.29
Years at Study School			
Grade 2			
Reading	.14	.19	.09
Math	.16	.18	-.03
Grade 5			
Reading	.18	.18	.04
Math	.22	.32	.25

N=55
Source: Report 16, Table 7-1

Coordination of Instruction

In our model of the education process, coordination of instruction is thought to operate through the coordination of use of resources, through the operation of instructional practices, and through the factors of opportunity-to-learn. Coordination of instruction refers to the sequencing and relating of learning tasks, and was measured by how much teachers knew about each other's instruction, as indicated in interviews. It is also related to how much teachers plan instruction together. The importance of coordination of instruction is reflected by the fact that about 40 percent of the students have more than one teacher during the school year. Table IX-12 shows the relation between coordination of instruction and student achievement.

Table IX-12

Correlation of Coordination of Instruction with Student Achievement

	Fall Achievement		Spring Achievement		Gain	
	School-wide	Grade-wide	School-wide	Grade-wide	School-wide	Grade-wide
Grade 2						
Reading	.23	.11	.39	.42	.26	.50
Math	.32	.48	.33	.60	.10	.51
Grade 5						
Reading	.30	.35	.33	.46	.16	.32
Math	.38	.37	.44	.45	.16	.25

N for schools is 55; for grades, N varies from 40 to 47.
Source: Report 16, Tables 6-5 and 6-6.

It should be noted that higher coordination of instruction is associated with higher fall achievement scores, which indicates that there is more coordination of instruction in the higher achieving and more economically advantaged schools. Also there is a positive relationship of coordination of instruction and achievement gain. Since there are these positive relationships, they should be associated with various instructional practices and components of opportunity-to-learn. However, the relationships between coordination of instruction and on-task behavior were small and of mixed sign, with test-curriculum overlap they were also not significant, but they were positive with amount of time in instruction. Perhaps where teachers coordinated instruction, they are able to devote their time more effectively to instruction. This is supported by a negative correlation of about .30 between the amount of time spent in behavioral management and coordination of instruction. Also there were significant positive correlations between coordination of instruction and the flexible use of specialists, and also with the variety of equipment use in instruction. As might be expected from the previous section, there were correlations in the neighborhood of .57 between teacher satisfaction and coordination of instruction. Generally, coordination of instruction is related to a number of important instructional processes and staff characteristics.

Instructional Leadership

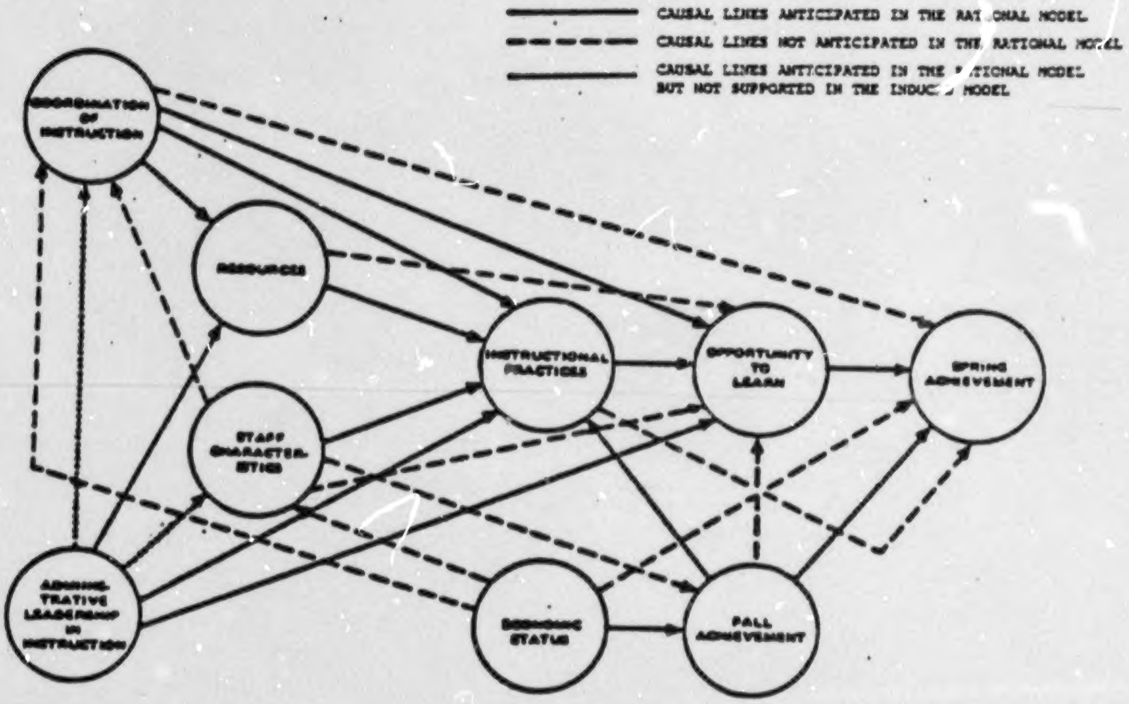
The principal has as one of his responsibilities the leadership of instruction; but it is only one of his many responsibilities, which include the providing of resources, the obtaining of staff, the coordination of instruction, and interacting with parents. We particularly studied the principal's role in instructional leadership. Previous studies have stressed the importance of this factor and we isolated it from the other parts of the duties of the principal. We defined instructional leadership in terms of four behaviors: the degree to which the principal was involved in deciding on curriculum, whether the principal had a particular view of instruction he felt strongly about, the extent to which the principal communicated to teachers about instruction, and the degree to which the principal influenced teachers' instruction. We developed a measure of instructional leadership based on interviews with the principal and the teachers. On a scale from 1 to 5, the average amount of instructional leadership was about 2.4, which does not indicate a high amount. When we investigated the relationship between instructional leadership and student achievement, there was a negative relationship which varied from -.03 to -.33 for fall and spring scores and insignificant and mixed signs for gain scores. This indicates that the principals exerted stronger instructional leadership in the schools with lower achieving students, but that such leadership did not affect the amount students learned. We also investigated the relationship of instructional leadership to test-curriculum overlap, to time in instruction, and to on-task behavior. The correlations were small and so variable as to be uninterpretable. Other factors were investigated and it was found that the flexible use of specialists and the amount of their experience were positively correlated with principals' instructional leadership. This pattern emphasizes the idea that principals who are assigned to low achieving schools exert more instructional leadership and use their resources more flexibly with low achieving students. But since low achieving students show smaller gains than high achieving students, the effects of instructional leadership are masked by the nature of the schools to which the principals are assigned. However, to the extent that the principals and the teachers share a common view about the nature of the reading and math programs and how they should be taught, there is a positive correlation, in the order of .16, between achievement gain and this commonly shared view. After all, teachers do the instruction and the principal can only influence instruction through them.

THE FINAL EDUCATIONAL PROCESS MODEL

At the beginning of this chapter we presented a rational model of the educational process. Each of the subsequent sections dealt with one of the factors making up the model. Generally each of the factors was made up of a number of subfactors that we observed and measured in the fifty-five high-poverty schools. We also discussed the interrelations among the factors, and particularly the relation of the opportunity-to-learn factor and the spring achievement factor. Now that we have examined all of these factors and their interrelationships, we are in a position to see if our proposed model actually fits the facts as obtained from the observations. The technical process for doing this is complex and is known as "causal modeling." This technique has been developed in recent years by Jöreskog and his associates and has recently been reviewed by Bentler (3).

The model was tested at the level of the instructional unit, that is the unit composed of the same students with the same instructional staff working on the same instructional curriculum. We selected as indicators those measures that seemed most promising in light of the results of the analyses reported in the previous sections of this chapter. Opportunity-to-learn was represented by measures of each of its three components: instructional time, curriculum overlap, and student on-task behavior. The instructional practices included in the model were the proportion of the teacher's time spent in behavioral management, the proportion of time spent off-task, and the proportion of time spent in instruction. Resource use was confined to measures of the variety of equipment used, the hours of equipment use, and the hours of material use. The staff characteristics entering in the model were recent teacher training, teacher's job satisfaction, and teacher's years of experience at the current school. Both gradewide and schoolwide measures of coordination of instruction were included in the model. Principal's instructional leadership was represented by a measure of the principal's influence in the decisions regarding curriculum. The other factors were represented by single scores, as mentioned in the sections discussing them.

When the path coefficients were determined, it was apparent that the rational model was too simple to fit the data. That is to say that while the general nature of the model was consistent with the observed facts, there were more interacting components than had been anticipated. Figure IX-2 shows the model that was derived by comparing the several models fitted by grade and by subject matter (for reading and math in both grades 2 and 5). The paths shown are those that were significant in at least two of the four data sets and not of an opposite sign in any. Thus the model represents the "best" overall model from our data.


CAUSAL LINES ANTICIPATED IN THE RATIONAL MODEL
CAUSAL LINES NOT ANTICIPATED IN THE RATIONAL MODEL
CAUSAL LINES ANTICIPATED IN THE RATIONAL MODEL BUT NOT SUPPORTED IN THE INDUCED MODEL
COORDINATION OF INSTRUCTION
RESOURCES
INSTRUCTIONAL PRACTICES
OPPORTUNITY TO LEARN
SPRING ACHIEVEMENT
STAFF CHARACTERISTICS
ADMINISTRATIVE LEADERSHIP IN INSTRUCTION
ECONOMIC STATUS
FALL ACHIEVEMENT

Source: Report 16, Figure 9-2.

Figure IX-2

The Final Educational Process Model

Inspection of the final model shows it to be much more complex than we had anticipated. This finding reinforces our conclusions that the educational process is an exceedingly complex activity. Important changes from the rational model to the final model are:

- The final model has many more non-zero causal links than were included in the rational model. Important among these are direct links to spring achievement from instructional practices, coordination of instruction, and economic status.

- Economic status appears to have a widespread influence on variables which include, in addition to fall achievement, spring achievement, coordination of instruction, and staff characteristics.
- The influence of principal's instructional leadership is less widespread than indicated in the rational model. Specifically, evidence for a causal link from principal's instructional leadership to coordination of instruction was not found; also not supported was the causal link to staff characteristics.

In addition to the analyses reported here, Report 16 included a discussion of analyses based on school level data. Generally these results are consistent with those already presented. Based on the results from the various models we can conclude that spring achievement, the component in our research that is the ultimate payoff of the educational process, is in direct causal relationship with the following:

The amount of student on-task behavior

The degree to which the content of the curriculum corresponds to the spring achievement test

The extent of coordination of instruction

The level of socioeconomic status

Fall achievement.

Indirect causal contributors to spring achievement are:

Proportion of teacher's time spent in instruction, an increase in which leads to increased on-task behavior.

Proportion of teacher's time spent in behavioral management, a decrease in which leads to increased on-task behavior.

Teachers' experience, more of which leads to increased curriculum overlap and indirectly to increased on-task behavior, mediated by decreased time spent in behavioral management. Also, more teacher experience leads to increased teacher satisfaction which leads to increased coordination of instruction.

Fall achievement level, higher levels of which increased curriculum overlap.

Socioeconomic status, higher levels of which lead to increased coordination of instruction and increased fall achievement.

In summary, we now have a model of the educational process that is supported by a sizable amount of data collected from actual observations in schools and classrooms. The educational process is complex, but one that we are understanding better. We now know which factors of the educational process are important to student achievement and thus we can infer which ones we should attempt to improve.

CHAPTER X. WHAT IS THE HOME ENVIRONMENT OF ELEMENTARY SCHOOL CHILDREN?

Summary

This chapter examines the home environment of elementary school children. The results show that:

- *The usual home of an elementary school child is a two-adult family home, with parents about 35 years old; they are white, living in a single-family dwelling and have graduated from high-school. But there are from 20 to 35 percent who come from homes with quite different characteristics.*
- *At home, the typical student spends about two hours a day playing, an hour doing chores, about two hours watching TV, an hour reading for pleasure, and an hour doing school homework.*
- *Most of the children come from homes where the parents are involved in school related extra-curricular activities and most parents attend parent-teacher conferences.*
- *Parents rate the quality of their children's schools as excellent or good in over 75 percent of the cases.*
- *Almost all parents expect their children to graduate from high school and over 25 percent expect them to graduate from college.*
- *The home environment of Title I students is quite similar to that of regular students. However, there is a slight tendency for more Title I students to come from homes with less well educated parents, from minority homes, from homes with a somewhat less intellectual environment, and with somewhat lower expectations regarding school attainment.*

INTRODUCTION

From what kinds of homes do America's school children come? Data from the Participation Study throws light on this question. It will be remembered that about 15,000 parents—the parents of a representative sample of the nation's elementary school students--were interviewed in the home. From these data we obtain the following picture. The typical student's home has parents who are about 35 years old, there are four or five members in the family which is composed of two adults, living in a single-family dwelling; the parents are white, and are high school graduates. While this is the typical picture, Table X-1 shows that there is considerable variation from these typical figures. Ninety-five percent of the parents are between 25 and 55 years of age, and about 80 percent of the families have three to six members. About 80 percent of the children come from two-adult families, but about 20 percent of the families have only one adult. About 80 percent live in single family dwellings while 20 percent live in multiple-unit dwellings. About 75 percent are white, non-Hispanic, while 25 percent of the families are minority families. About a third of the parents do not have a high school education, about a third are high school graduates, while a third have had some college, with 17 percent being college graduates. From the above it is clear that many children come from homes having somewhat similar background characteristics, but there are also many children whose home backgrounds differ significantly.

HOME CHARACTERISTICS AND ACADEMIC ACHIEVEMENT

How are these home characteristics related to the students' academic achievement? Table X-2 shows the correlation between home characteristics and student achievement in reading and math. It will be seen that none of the relationships are high, and they are generally in the expected direction. The highest relationship is between head of household's education and achievement. The relationship is higher for reading than for math and it is higher for regular students than for Title I students. The smaller relationship for Title I students is partially accounted for by the more restricted range of the variables for Title I students. As would be expected, those students who are members of the majority, live in single-family dwellings, have both parents in the home, and come from smaller families have higher achievement in both reading and math. While the relationships are in the expected direction, they are typically small and allow for considerable influence from other factors, such as the impact of school.

Table X-1

Students' Home Characteristics

	8th Grade or less	9-11 grade	High School Graduate	Some College	College Graduate	Post-Graduate
Head of Household's Age (%)	17-24	25-34	35-44	45-54	55-64	65 and over
	1	37	43	15	3	1
Family Size (%)	2	3 4	5 6	7 8	9	10 or more
		11 30	26 15	8 4	2	2
One or Two Adult Family Home (%)		One Adult Family 18			Two Adult Family 82	
Ethnic Status (%)		Majority 77			Minority 23	
Living Quarters (%)		Single Family Dwelling 82			Multiple-Unit Dwelling 18	
Head of Household's Education (5)	15	19	32	18	9	8

Source: Report 4, Table 2-2

Table X-2

Relation of Household Characteristics and Achievement

	Reading		Math	
	Regular Students	Title I Students	Regular Students	Title I Students
Head of Household's Age	.05	-.06	.05	-.01
Family Size	-.11	-.09	-.04	-.05
One or Two Adults in Home	.16	.07	.15	.11
Ethnic Status	-.25	-.18	-.23	-.18
Single or Multiple Dwellings	-.15	-.11	-.14	-.08
Head of Household's Education	.35	.16	.29	.11

Source: Report 4, Table 2-5.

STUDENT HOME ACTIVITIES

While the factors discussed so far are related to achievement, they are static, demographic factors and the real impact of home environment is expressed through actual activities in the home such as the attitudes of the parents toward the importance of schooling, how the students spend their free time, and the school-related assistance they get at home. What do the students do at home? Table X-3 shows the amount of time spent by regular and Title I students in a number of activities such as time spent playing, doing chores, watching TV, reading, and doing homework.

Since the total amount of time available is fixed, if a child spends a great deal of time on one activity the child must spend less time on other activities. As a general picture, during the day the "typical" child spends about two hours playing, about an hour doing chores, about two hours watching TV, about an hour reading, and about an hour on homework. These are the amounts of time spent as reported by their parents. When comparing the time spent by regular students with the amount spent by Title I students one is impressed by the similarity of the figures. There may be a slight tendency for Title I students to spend more time on homework, on watching TV, and playing, while spending less time on reading. But the differences are very small and do not support the idea that, relative to regular students, poorer performing students engage in significantly less academically oriented activities at home. This picture is further supported by Table X-4 which compares the homework activities of regular and Title I students as reported by their parents. Again the figures are quite similar, but with some small differences. Title I students bring home a little more homework, and they get a little more assistance than regular students. There seems to be a tendency for the Title I students to be helped by family members other than the parents more frequently than regular students. These other family members were identified as older brothers or sisters.

Table X-3

Time Spent on Various Home Activities (Daily)

	Regular Students	Title I Students
	%	%
Time Spent Doing Homework		
No Time	18	16
Less than 1 hour	36	31
1 hour or more	45	53
Time Spent Reading		
Less than 1/2 hour	17	25
1/2 to 1 hour	34	32
1 hour or more	48	43
Time Spent Watching TV		
Less than 1½ hours	17	13
1½ to 2½ hours	40	35
2½ hours or more	43	47
Time Spent Doing Chores		
No Time	14	20
Less than 1/2 hour	24	18
1/2 to 1½ hours	59	53
More than 1½ hours	6	10
Time Spent Playing		
Less than 1 hour	10	10
1 to 2 hours	34	29
2 to 2½ hours	32	34
2½ hours or more	24	27

Source: Report 4, Table 2-12.

Table X-4

Student Homework Activities

	Regular Students	Title I Students
	%	%
Frequency of Child Bringing Home Schoolwork		
Never	9	9
Once a Month	22	18
Once a Week	13	12
2 or 3 Times a Week	26	26
Every Day	30	35
Frequency of Child Getting Help on Schoolwork		
No Schoolwork brought Home	6	6
Never	6	5
Not Very Often	29	21
Somewhat Often	28	28
Very Often	32	40
Who Helps Child?		
Mother	60	45
Father	17	9
Others	16	36
No one	7	10

Source: Report 4, Table 4-7.

It has often been suggested that poor children, predominantly Title I children, do not have the educational opportunity in the home that regular children have. It is thought that there are no magazines or books in many poor homes. Table X-5 shows the number of books appropriate for a child in the home for both regular students and Title I students. It will be seen that the vast majority of all students have appropriate books at home that they can read, but it seems that more Title I students have no books, and those who do have books have fewer than regular students. This is consistent with the picture that is emerging of the Title I students as having a home environment that is not greatly dissimilar to that of the regular students, but still one that is somewhat less oriented to intellectual activities.

Table X-5

Books in Home

Number of Books in Home Child can Read	Percent Regular Students	Percent Title I Students
None	5	13
1-10	19	38
11-30	28	26
31-50	16	11
51 or over	32	12

Source: Report 4, Table 4-10.

In addition to strictly home activities the child is influenced by the parents' attitude toward the student's school and their participation in school activities. Table X-6 shows the participation of parents and students in school related non-instructional activities. It will be seen that the

Table X-6

Participation in Extra-Instructional Activities

	Percent Regular Students	Percent Title I Students
Percent of Families where Adult Member Participates in Extra-Instructional Activities	80	71
Percent of Families where Child Participates in Extra-Instructional Activities	61	59
Percent of Families where Child Participates and Adult Attends Extra-Instructional Activites.	60	53

Source: Report 4, Table 4-3.

majority of both parents and students participate in extra curricular activities. Again the picture emerges of not dissimilar activities for regular students and Title I students, although the Title I students and their parents seem to be slightly less involved than regular students and their parents. Another indication of parents' involvement with the school is the frequency of parent-teacher conferences. Table X-7 shows a number of facts regarding these meetings. First it will be noted that there are no important differences in the frequency or nature of such conferences between regular and Title I students. About 70 percent of the parents have such conferences and about a third have more than one meeting annually. These conferences are almost always initiated by either the school principal or teacher. About 20 percent are related to student problems at school, but most of them are called for general discussions of student progress. Parents report the conferences to be helpful.

Table X-7

Parent-Teacher Conferences

Annual Number of Parent-Teacher Conferences	Percent Regular Students	Percent Title I Students
0	27	32
1	45	35
2	16	17
3	6	9
4 or more	6	8
How Conferences Are Initiated		
Note sent home	75	74
Teacher or Principal calls	5	6
Sign up at Meeting	4	3
Parent asks for Meeting	13	16
Other	2	2
Reason for a Personal Conference		
Discuss Child's Progress	58	57
Discuss Child's Problems	17	21
Discuss Grades and/or Test Scores	7	7
Generally Exchange Information	16	12
Other	2	3
Are Personal Conferences Helpful?		
Yes	93	95
No	7	5

Source: Report 4, Table 4-2.

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SCHOOL QUALITY AND PARENTS' EXPECTATIONS

Parents were asked to rate the quality of their child's school. Table X-8 shows the results. It is impressive that over 75 percent of all parents rate the school's quality as excellent or good. Title I students' parents rate the schools almost as high as regular students' parents. These ratings are in marked contrast to the stereotype expressed by some of the media and some political sources. One hears schools characterized as "disasters," "incompetent," "incredibly poor," etc. At least in the minds of parents these stereotypes are far from accurate. It will also be remembered from Chapter V that all groups of students increase the level of their academic performance from year to year. No doubt schools could be improved and students could learn more, but parents give schools a positive report card.

Table X-8

Parent's Rating of Quality of Child's School

	Percent Regular Students	Percent Title I Students
Excellent	34	25
Good	53	53
Fair	12	19
Poor	2	3

Source: Report 4, Table 4-13.

A final indication of parents' attitude toward the academic process is given by their expectations regarding how much education their children will achieve. Table X-9 shows the highest educational level parents expect for their children.

Table X-9

Parent's Expectation for Child's Educational Attainments

Parent's Expectation of Level of Child's Final Schooling	Percent Regular Students	Percent Title I Students
Less than High School	1	4
High School Graduates	38	58
Some College	16	14
College Graduate	39	21
Post Graduate	6	2

Source: Report 4, Table 4-11.

Practically all parents, of both regular and Title I students, expect their child to graduate from high school. Title I parents have a somewhat lower academic aspiration for their children than the parents of regular students. Almost 45 percent of the parents of regular students expect their child to graduate from college but only about 25 percent of Title I parents do.

In summarizing this material we see that the typical home of an elementary school child is a two-adult family home, with the parents about 35 years old, they are white, living in a single family dwelling and have graduated from high school. But there are 20 to 25 percent of the students who come from single-adult family homes, with younger (or older) parents, who are black or from an Hispanic background, living in multiple dwelling homes and whose parents did not graduate from high school. Although the relationships are not strong, there is a tendency for students to do better academically who come from the two-adult families, of smaller size, who are white, living in a single family dwelling, whose parents are better educated. These relationships are stronger for regular students than they are for Title I students.

At home, the typical student spends about two hours a day playing, an hour doing chores, about two hours watching TV, an hour reading for pleasure, and an hour on homework. Most students bring homework home, but about 25 percent either never do, or do so only once a month. When the students bring homework home they usually receive help with it from their mother or from older children. Most children have books in the home they can read for pleasure, although about 10 percent have no such books.

Most of the children come from homes where the parents are involved in school related extra-curricular activities and most of the students are involved in such activities. The vast majority of parents attend parent-teacher conferences which are initiated by the school. Most of these meetings are for a general review of student progress, although about 20 percent are called because of student problems.

Parents rate the quality of their students' schools as excellent or good over 75 percent of the time. Very few characterize them as poor, a finding in marked contrast to the image often reflected by the media and some politicians. Generally parents expect their children to graduate from high school and over 25 percent expect them to graduate from college.

When Title I students are compared with regular students one is impressed with the fact that Title I students' home environments are quite similar to regular students on the above characteristics. There is, however, a tendency for more of the Title I students to come from homes of less well educated paretns, from minority homes, from homes with a somewhat less intellectual atmosphere, and with somewhat lower expectations regarding school attainment. While the differences are not large, they may be quite influential and we will see in the next section how much influence they have on differences in student performance.

CHAPTER XI. WHAT ARE THE CONTRIBUTIONS OF BACKGROUND AND SCHOOLING TO STUDENT ACADEMIC ACHIEVEMENT?

Summary

The data from the Sustaining Effects Study were analyzed to throw light on the controversy that had existed regarding the relative importance of background factors and schooling factors in accounting for educational achievement. Data at the individual student level were available regarding home background, economic status, the characteristics of the school attended, and achievement over a three year period. Three different composites were formed: Student Background, School Characteristics, and School Learning Experience. The relationship between these and student achievement was explored using the techniques of causal analysis. It was found that while background characteristics were important determiners of achievement, the school learning experiences were also important, particularly in the early grades.

INTRODUCTION

The Sustaining Effects Study was designed primarily to study compensatory education and the process of elementary education. However, in collecting data to study these areas we also obtained information that should throw light on the controversy that has surrounded the question of equality of educational opportunity. As is well known, the Coleman report, titled *Equality of Educational Opportunity*, concluded that "schools bring little influence to bear on a child's achievement that is independent of his background and general social context," (4). This conclusion has been much debated and it is generally agreed that the data available were not ideal for establishing this conclusion. Data from the Sustaining Effects Study are superior to those previously available because we have quite good home background and economic data for individual students (see Chapter IV), and we also have achievement data for each student for three successive years. (No individual student data were available in the Coleman study.) In addition, we have quite detailed data on each school attended by the students. Since these data were available we undertook an analysis of the relative contribution of the students' background, of the schools attended, and of the instruction received as they affect student achievement.

Report 20 is devoted to a discussion of the strengths and weaknesses of previous studies, and to the analysis of these new data. In this chapter we simply report the way our analysis was done and give the major results. Those more deeply concerned with this complex subject will want to examine Report 20 in detail. The general nature of the analysis was to develop a theoretical model of the direct and indirect influences of socio-economic background, characteristics of the school attended, and educational experiences as they influenced students' achievements on tests of reading and math. The analysis depended on the technique known as "causal modeling" mentioned previously in Chapter IX. The analysis used data collected in the "Participation Study," which involved the selection of a nationally representative sample of elementa school students and the conducting of home interviews with their parents. (Se Chapter IV for a more detailed description of the sample and the data collected.) Although the Participation Study initially involved 15,579 students, by the end of three years there were only 2,966 students remaining on which there were complete data. An analysis of this attrition shows that the greatest losses were sustained by the least advantaged socio-economically, but it is still believed that the sample is sufficiently representative to allow generalizable conclusions to be drawn.

Three different composite variables were formed: one for socio-economic background, called the Background Composite (B); one for the Characteristics of the School (S); and one for the School Educational Experiences (X). Each composite was formed by regressing later achievement on earlier achievement, cohort, and a set of variables that were thought to represent the factor making up the component. This method of forming the composites means that the variables selected to make up the components were those most important in accounting for the achievement gain from the fall 1976 to the spring 1979.

THE BACKGROUND COMPONENT

By means of this regression analysis, eight variables were selected from a set of twelve to define the Background Component (B). These variables were:

1. Father's education (.40)
2. Mother's education (.40)
3. Occupation of the household head (.30)
4. Family income (.37)
5. Race/ethnicity (.38)
6. Number of parents in the home (.20)
7. Number of books in the home at the child's reading level (.47)
8. Parent's attendance at school events (.26)

Shown after each of the variables is the correlation of that variable with the Fall 1976 achievement measure. It is interesting to note that the highest correlation is between achievement and number of books in the home at the child's reading level, which implies that background is more than just socioeconomic status, but rather the intellectual emphasis typically found in homes of higher socioeconomic status.

It should be noted that these correlations reflect how much the factors influence the achievement level of the students when they entered the study and for cohort 1 they reflect the student's achievement level on entering the first grade. Thus, the Background Composite measures the abilities the student brings to school based on several factors: native ability, the motivation given by parents and other non-school experiences, the influence of education related factors in the home such as the presence of books, and also the influence of preschool peers and their attitude toward learning.

THE SCHOOL CHARACTERISTICS COMPONENT

In addition to a student's background, the characteristics of the school attended affect the student's learning. These characteristics can be defined in a number of ways and include such factors as the affluence of the neighborhood surrounding the school, the school's physical facilities, the characteristics of the student body, and the characteristics of the staff. Again the regression technique was employed to select the variables to make up the School Characteristics (S) composite. The variables defining the composite were:

1. The racial/ethnic composition of the student's grade at the school (.34)
2. The average academic achievement of the grade at the school in the fall of 1976 (.52)
3. The educational attainment of the school's principal (-.11)
4. The level of compensation given teachers for inservice training (.00)
5. The presence of a central library at the school (-.02)

There were fifteen other school characteristics included in the regression analysis but they would not have improved the prediction of achievement. These other variables included per-pupil expenditures, the presence of reading and/or math resource centers, relative size of staff, receipt of CE funds, hours of instruction in the school, teaching experience of the staff, etc. Again the correlations between the variables and fall 1976 achievement scores are given in parentheses.

It will be seen that the two largest correlations are for the average achievement level in the school and grade, and the racial/ethnic composition of the school and grade. These two correlations are between the individual student's fall achievement scores and the school-by-grade average attainment and racial composition. Thus, the School Characteristics (S) composite is almost completely defined in terms of the characteristics of the students attending the school. The correlation of factors making up the School Characteristics Composite, such as the average school achievement level, with the factors making up the Background Composite is quite high. For example, the correlations between average school achievement and race/ethnicity in the Background Composite is .51, with family income it is .46, and with father's education it is .40. Thus, in many ways the School Characteristics Composite is simply a reflection of the background of the students attending the school. Peer characteristics are a good predictor of a student's achievement largely because these characteristics are highly related to the student's background.

THE SCHOOL LEARNING EXPERIENCES COMPONENT

In accounting for a student's achievement, we have pointed to the native intelligence, to socioeconomic background, and to the characteristics of the school attended. In addition there are the actual School Learning Experiences (X) that take place in the classroom. Again a number of variables were explored to make up the School Learning Experience (X) composite. The significant variables were:

1. The average academic achievement of the student's homeroom (.51)
2. The racial/ethnic composition of the student's homeroom (.34)
3. The average teaching experience of the teachers (.11)
4. Whether or not the student received compensatory education services (-.35)
5. The weeks of student's attendance at school (.16)
6. The number of hours of regular instruction in reading received by the student during the school year (.11)
7. The number of hours of regular math instruction received by the student during the school year (.07)

8. The number of hours of special reading instruction received during the school year (-.22)

9. The number of hours of special math instruction received during the school year (-.15)

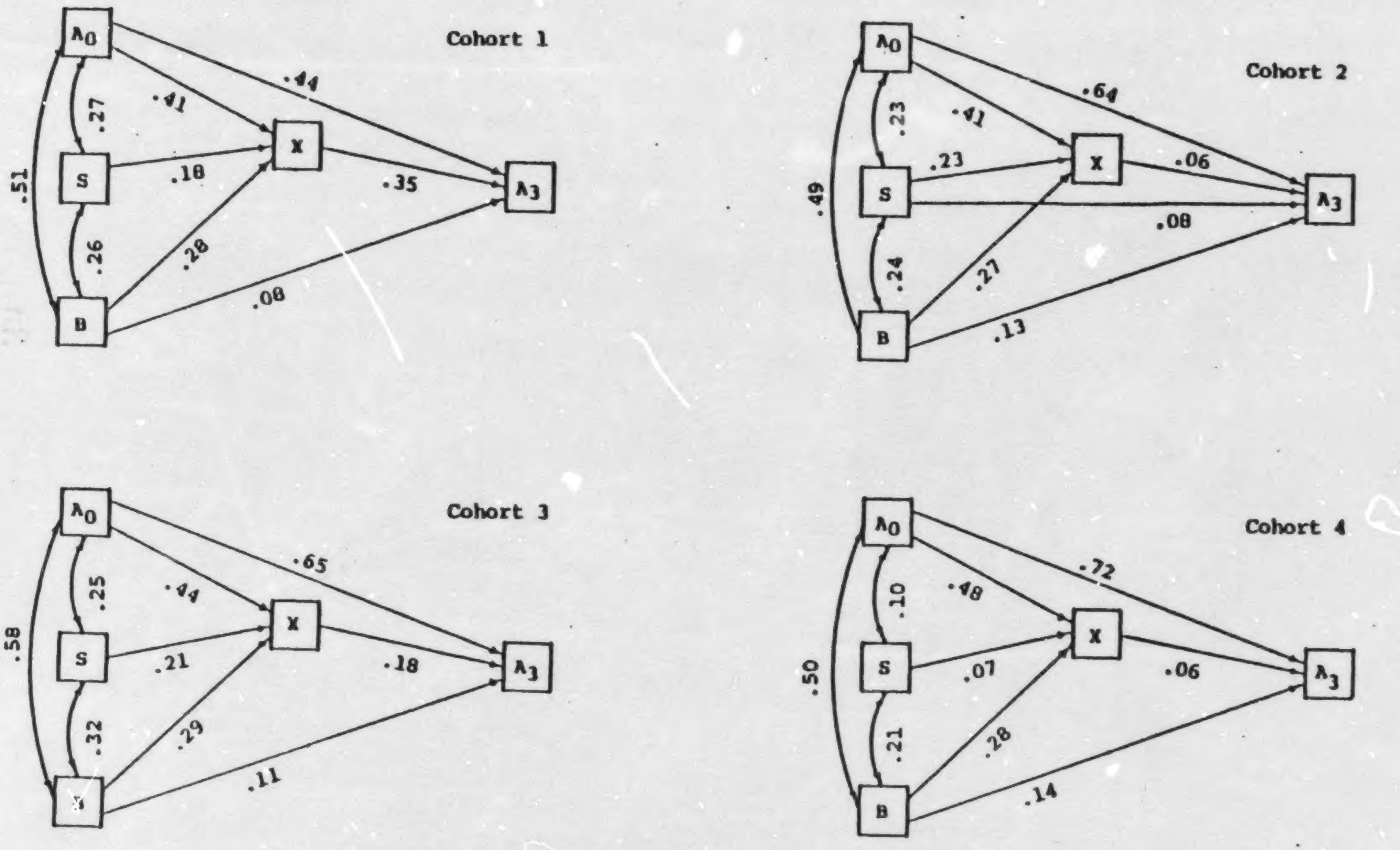
The correlations given after each variable are between that variable and the student's spring 1977 achievement score.

We see that the characteristics of the student's homeroom, which are also related to the student's background, are closely related to the student's individual achievement. Variables related more directly to instruction such as hours of instruction and receipt of compensatory education are related to the student's achievement, but to a smaller degree than many of the group membership characteristics. Incidentally, it should not be surprising that the receipt of compensatory education and the amount of special instruction are negatively related to achievement, since these instructional activities are the ones most intensively received by the lowest achieving students.

THE RELATIONSHIP OF THE COMPONENTS TO ACHIEVEMENT

We have shown how the three components were formed and we have shown the relationship between the variables and measures of achievement. But we have not yet emphasized the idea that these composites have both direct and indirect effects on how much the student learns. For example, the number of books in the home that the student can read, directly affects the achievement shown by the student when he enters school. But this variable also indirectly affects the student's motivation. Since the parents have provided these materials they have given motivation for the student to read well in school, and because the student initially does well in school, he receives additional rewards that motivate him to continue superior achievement. All of the composites and their variables are interrelated in complex ways and also have direct and indirect effects on later achievement. In an effort to understand how these factors influence the acquisition of reading and math achievement, we developed a model of the background and schooling process and analyzed the relationships involved, using the methods of causal analysis. These analyses were done for each cohort since the relationships for students just entering school might well be different from those for students in the more advanced grades. We should remember that students in cohort 1 start in the first grade and are followed through the third grade, and similarly with each cohort so that cohort 4 starts in the fourth grade and goes through the sixth grade. With cohort 1 we have students who are just entering school and the influence of background and school characteristics might well be different than for students from cohort 4 who started the study with three years of school experience before we had any achievement measures on them. Figure XI-1 shows the results of the analysis for each of the four cohorts. In the figure, 'B' stands for the Background Composite, 'S' for the School Characteristics Composite, 'X' for the Learning Experience Composite, 'A_0' stands for the achievement level at the beginning of the study, and 'A_3' stands for the achievement level three years later. The results are based on academic growth from the beginning of the first year to the end of the third year. Similar analyses were performed on year-by-year data, that is year 1 to year 2 and year 2 to year 3. The results were substantially similar to those reported here and are given in Report 20.

We will examine the relationships starting with the composites on the left hand side of the model since these are the most removed from the level of achievement at the end of three years. First note that Background is related to Initial Achievement (A_0) with coefficients between .49 and .58. From cohort to cohort these coefficients are fairly similar in size and do not show any systematic variation. They do indicate a fairly strong relationship between the student's background and his initial level of achievement. Next note that the relationships between Background and School Characteristics are


Cohort 1
A0
S
B
X
A3
.51
.27
.26
.41
.44
.18
.28
.08
.35
Cohort 2
A0
S
B
X
A3
.49
.23
.24
.41
.64
.23
.27
.13
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.08
Cohort 3
A0
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A3
.58
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.65
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.11
.18
Cohort 4
A0
S
B
X
A3
.50
.10
.21
.48
.72
.07
.28
.14
.06

Figure XI-1

Path Diagrams With Estimates of Standardized Coefficients.
(With Nonsignificant Effects Omitted)

Source: Report 20, Figure 3-2.

between .21 and .32 and again without any particular pattern. They are smaller than those between Background and Initial Achievement, but show a tendency for students from backgrounds with greater resources to attend schools having more resources. The relationship between School Characteristics and Initial Achievement (A_0) range from .10 to .27. These are generally of the same magnitude as those between Background and School Characteristics, indicating that students attending schools having more resources tend to have higher initial achievement. Both the background of the student and the characteristics of the schools they attend are significantly related to their initial achievement.

Next we will examine the relation of these background related factors to the School Learning Experience (X). The path from Background to School Learning Experience has practically no variation across cohorts and is about .28, showing that students with a background with more resources tend to have better school learning experiences, but the magnitudes of the path coefficients are only modest. The coefficients from School Characteristics to School Learning Experiences range from .07 to .23, with the average being about .17; this finding suggests that schools with superior characteristics tend to have good learning experiences for their students, but the relationship is quite modest in strength. The path coefficients from Initial Achievement to School Learning Experiences are considerably larger than the previous ones, ranging from .41 to .48. This shows that those students who have high initial achievement levels are in school learning situations that are also quite favorable. Finally the relationship between Initial Achievement and achievement at the end of three years is high for all cohorts, starting with .44 for cohort 1, increasing to .64 for cohort 2, being .65 for cohort 3, and growing up to .72 for cohort 4. These high relationships are important since they show that the highest relationship to year three achievement is the achievement at which the child entered the school for cohort 1 or enters the study for other cohorts. But also note that the strength of the relationship grows from cohort to cohort; this says that as the student progresses through school his level of performance becomes progressively more related to his previous level of performance. The fact that it is the lowest for cohort 1 says that there is a greater possibility of influencing future achievement in the first and second grades. Also note that the paths from Background to Final Achievement are quite weak, ranging from .08 to .14. This indicates that Background has relatively little direct influence on final achievement but rather that its influence is indirect, through Initial Achievement, School Characteristics, and the School Learning Experiences.

Finally note the path coefficients between School Learning Experiences and Final Achievement, which are .35 for cohort 1, .06 for cohort 2 (somewhat low, but complemented by the significant direct coefficient between School Characteristics and Final Achievement unique to this cohort), .18 for cohort 3, and .06 for cohort 4. These figures are very important. They imply that in the beginning grades, school learning experiences are quite effective, almost as effective as Initial Achievement and perhaps as important as Background. But as grade progresses, the influence of School Learning Experiences decreases until by the fourth, fifth, and sixth grades School Learning Experiences seem to exert very little influence on Final Achievement. At the same time Background is only very modestly related to final achievement in any direct way, although it still exerts a considerable influence indirectly through its relationship to Initial Achievement. It will be remembered from Chapter V that the strongest influence of compensatory reading education was also seen in the beginning grades. These two lines of evidence strongly suggest that the time to influence students' achievement is early in their school experiences.

It should be mentioned that a similar model was developed in which the achievement variables were analyzed as two components, one for reading and one for math. The results were quite similar to those already presented except that for math the Background factor was not quite as strong as it was for reading, and the influence of School Learning Experience was stronger for math than for reading. Again we see that reading is influenced by factors that occur outside the school to a much greater extent that is the case for math. As we would expect, academic subjects that are learned more formally are more uniquely learned in school, whereas those of a more general nature may frequently be learned in other than the school context, particularly by students from advantaged backgrounds. These results are quite compatible with the recent findings of Welch, Anderson, and Harris (37) who found a quite significant schooling effect for high school math.

The data presented are relevant to Coleman's conclusions about the importance of students' background and the unimportance of school experiences. The present data certainly confirm the importance of background characteristics but leave unanswered the question of what proportion of background is related to influenceable home factors and how much is simple native intelligence. Our opinion is that both factors are involved and that with proper support the home factors could be improved for students coming from disadvantaged homes. This would involve making reading materials available in the home and getting parents to see that the child used them. It would also involve motivating the parents to value intellectual experiences. In addition, the data show, contrary to Coleman's results, that in the early school years the characteristics of the School Learning Experiences is of considerable importance. These findings would seem to place emphasis on the importance of positive learning experiences in the early grades and give support to efforts to improve school experiences in the beginning grades.

It is worthwhile to speculate that early childhood experiences are very important in determining a child's later academic performance. If at a young age the child has parents who provide early opportunities for experience with books, who motivate the child to excel in verbal areas, and who give him early preschool experiences, it seems that initial achievement will be high. If initial achievement is high, then the child has the best chances of continuing to experience successful academic achievement. It would seem that whatever can be done to bring about these favorable early childhood experiences should be done if we value good academic performance. Such measures would be particularly important in the homes of disadvantaged children.

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